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THE SYSTEM of electric underground haulage tried at the Quincy Mine, in the Lake Superior copper district, has proved very successful in saving labor and reducing costs. Last year a considerable part of the rock mined was moved by electric power underground, and the company has decided to add to the system, so that practically all the rock brought from the rifts and stopes to the shafts will be handled by the electric motors. As nearly 900,000 tons of rock have to be moved yearly in this mine, a reduction in the cost of tramming is important. The additional equipment will be installed as soon as it can be delivered.

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THE INCREASE in the price of coal, which will necessarily follow the adoption of the new bituminous wage scale on April 1st, will be an important item in mining and manufacturing costs. It will probably be greater than the advance in mining, since nearly all the Western lines are disposed to increase their freight rates on coal. In many cases, however, manufacturers would be willing to pay the higher prices, provided they are able to secure regular supplies. The delays and traffic blockades of the present winter have been, in many cases, more costly and vexatious than higher prices would be, if coupled with regular deliveries.

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THE REPORT of the Quincy Mining Company makes a very much better showing than that of the Osceola, to which we referred last week. It is true that the grade of the rock treated at the Quincy was slightly better than the Osceola result—0.996 per cent copper against 0.8 per cent—but there was a difference in the financial results much greater than this variation. The Quincy obtained an average price for its copper of 11.99 cents—or 12.15 cents if we include miscellaneous earnings—while the Osceola received only 11.78 cents. On the expense side, the Quincy copper cost only 9.53 cents per pound, against 11.77 cents at the Osceola; a very substantial difference. The Quincy Company therefore made the substantial profit of $498,000 for the year, on which the stockholders are to be congratulated. They are also fortunate in having a management which has never been afraid to tell just what it was doing. With 13 or 14-cent copper, which is not impossible, the mine should be able to double last year's profits in 1903.

⚒

REFERENCE has recently been made to the action taken by the Post Office officials in causing the inspectors throughout the country to take more energetic action with a view to preventing the use of the mails for the distribution of invitations to invest in fraudulent mining schemes. In all the big cities there are numerous offices which are kept busy with the pestilential distribution of all kinds of alluring invitations to join in undertakings which promise immedate dividends from all sorts of mining propositions. Some of these are only foolish; many of them are glaringly dishonest. They find a fruitful soil in the farming communities, among servant girls in large towns, among office boys, clerks and even—to a surprising degree—among sensible business men who ought to know better, but "take a gamble on the quiet," and say nothing about it when they lose. The direct result is usually bad enough in itself, but it has other effects which reach beyond the immediate victims, in that it discredits all mining and puts it, in the popular mind, on a par with Monte Carlo and the Turf. This is hurtful to an industry which is as honorable as agriculture and as profitable as manufacturing.

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IT IS AN encouraging sign that some of our prominent iron companies are taking steps towards the utilization of by-products which have heretofore gone largely to waste. The Tennessee Coal, Iron and Railroad Company, in its report for 1902, states that the coke-oven gases which have heretofore been a waste product are now used to make steam for hoisting and pumping, while a plant is under construction at the Ensley furnaces in which these gases will be used to make steam for the boilers supplying steam to the electric power and lighting station which will supply all of the furnaces, mills and shops at that place. At other points, these gases are to be used to supply power for generating electricity for lighting and haulage purposes. An important installation is now being constructed at the new works of the Lackawanna Steel Company, near Buffalo, where a number of gas engines which are expected to furnish a total of 40,000 horse-power, will be operated by the waste gases from the blast-furnaces.

At a time like the present, when business is extremely active, and profits are large, the introduction of improvements and economies is apt to be postponed until a more convenient season. It is evident, however, that these companies realize the importance of such economies and intend to realize them as soon as possible.

SOUTH AFRICAN PROGRESS.

It is announced that the ten leading financial groups operating on the Rand estimate that they will incur an additional capital expenditure of two hundred and fifty million dollars during the next decade. In connection with the financial side of the South African mining industry it is interesting to note that the dead loss to the mines caused by the late war is set down at over thirty-three million dollars, made up as follows: Loss owing to working by Boer Government, $5,096,400; bonus to workmen, $1,994,950, cost of mine police, $571,400; cost of mine guard, $774,785; pumping and maintenance, $13,018,320; interest on debentures, etc., $5,008,055; goods commandeered, $1,769,810; gold commandeered, $3,659,620; loss of plant and property destroyed, $1,443,870.

In the meantime, the labor situation dominates all else, and upon the eventual solution of this difficulty the successful prosecution of mining depends. Natives are coming in at an increasing rate, and those that are already on the ground are becoming more industrious. The problem will be gradually solved by patient, skillful management, and not violent remedies—such as the disguised slavery of the Kaffir or the importation of droves of Asiatic coolies. So eventually the phrase—tantamount to a proverb—that "Whites will supply the brains and blacks the muscle" will be fulfilled, a peaceful revolution consummated and a great industry firmly established.

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COLLEGE JOURNALS.

Our attention has recently been drawn to the number of excellent periodicals published—usually at quarterly intervals—by the leading technical colleges and schools of mines. The Columbia *School of Mines Quarterly* and the *Technology Review* of the Massachusetts Institute of Technology, the *Stevens Indicator* of the Stevens Institute, may be cited as good examples of the kind of publication referred to. Other educational institutions are similarly represented by bulletins and magazines edited by alumni, and assisted by professors as well as by students.

These publications vary in size, time of issue and in style, but they are uniformly inspired by earnest purpose and fraternal feeling. They often contain technical articles of considerable value, and record the authoritative views, both theoretical and practical, on education and science, uttered by the college presidents and others who speak as those having authority, and not as the scribes of the daily press. It is not too much to say that a great waste of energy is caused by the present methods of publication; the activity which might be united, to the extent suggested, is now spent amid a number of institutions and editors, while, as regards those who seek for information, they are compelled to give a needless amount of time to searching amid scattered volumes, in various libraries, before they find the information buried amid a mass of ephemeral matter.

We would suggest that the usefulness of the scattered work done in this way would be heightened and facilitated by a union of forces through an association of editors of these technical school quarterlies and journals, for the purpose of issuing periodicals which would be uniform in size and style, with a view finally to the publication of one review which would circulate among all the colleges contributory to the organization.

Such a publication would develop a broader spirit and distribute a wider information. College spirit is becoming in youth, it is good at all times, but in the grown man it is well if professional spirit dominates over all narrower affiliations. The generous exchange of ideas and the desire for fuller communion between those whose energies are dedicated to a common purpose is the dominating spirit of the true disciples of technical science and it is, as far as in us lies, the constant aim of this JOURNAL.

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THE IRON ORE HOLDINGS OF THE UNITED STATES STEEL CORPORATION.

When the United States Steel Corporation was first organized the popular anticipation was that the company would endeavor to control the iron and steel trade by the gradual absorption of all its existing rivals. That this anticipation was not correct is now well known. There are in the field a number of large concerns which are able to secure an important share of the trade and the big corporation has not up to the present time shown any disposition to absorb these rivals. It is true, that within the past few months, it has purchased the control of two or three concerns of considerable importance, but these purchases seem to have been influenced by other motives than the simple buying out of competitors.

The ultimate aim of the corporation is now seen to be to control the trade, not so much by a universal combination, as by the control and purchase so far as possible, of the sources of supply, the raw material of manufacture. Attention has been directed chiefly to the Lake Superior region in which the corporation acquired large and important interests through its purchase of the Carnegie Steel Company and the Illinois Steel Company. Last season very nearly 60 per cent of all the shipments made from the iron mines of Michigan and Minnesota were from properties controlled by the corporation. It has become more apparent this year by the statement, made at the conferences held for settling the price of Lake ore for the coming season, that the United States Corporation would not interfere, as it had no ore to buy and none to sell. The proportion of 60 per cent of the actual shipments made last year does not express the full extent of the holdings of the great company, and it would be comparatively easy for its mines to exceed considerably last year's output, if they should be worked to their full capacity. Moreover, the corporation's holdings are mainly on the newer portions of the iron ranges which are not as yet fully developed, and which have in all probability a much longer life before them than the mines of the old ranges.

Large as its holdings already are, they are gradually being extended as opportunity offers. The recent purchase of the Sharon Steel Company was apparently influenced, not so much by the value of the works themselves as by the fact that the company owned important ore interests on the Mesabi ranges. Moreover, it is reported that the corporation is negotiating for the purchase of the Mesabi mines acquired some time ago by the Eastern Minnesota, or Hill, interests. These mines were bought chiefly with a view to securing their railroad transportation; an object which could be quite as well attained by a traffic contract, and the sale appears quite probable. The importance of the Lake mines in the trade is well appreciated. For several years past fully three-quarters of the pig iron made in this country has been from Lake Superior ores. The only other deposits which approach them in extent and future possibilities are those of Alabama, and while the Southern mines have the advantage of location as regards proximity to coal, their ore is of very much lower grade. The average Southern ore requires a ton and a half or more of coke to produce the same quantity of iron which can be made with one ton of coke from Lake ores, and to this the additional costs of flux, furnace capacity, etc., are to be added; and this may in the future balance the cost of transporting ore and the difference in labor charges.

The United States Corporation has looked also beyond the immediate boundaries of the Lake region, as at present exploited, and is preparing to absorb the mines of the Canadian iron ranges which are just being opened. It is likewise reported, and with considerable show of probability, that purchases of iron ore lands in other sections of the United States, which have been going on for some time past, are really in its interest, while the purchase of the Troy Steel Products Company, effected a month or two since, carried with it the control of a large part of the magnetic ore deposits on Lake Champlain, the ownership of which was a determining feature in this purchase, as in the case of the Sharon Steel Company.

To return to the Lake Superior region, the United States Corporation is not only the largest shipper, but it has very much heavier ore reserves than any of the outside companies, and will doubtless be in a position to control practically the entire supply of lake ore before many years have elapsed.

With regard to coke, it is also well known that the Corporation obtained the control of the great portion of the Connellsville field, with its Carnegie purchase, and that it has been carefully adding to and extending that control. It is also adding extensively to its coal properties, with the same end in view.

There has been in the public press a good deal of discussion as to the influence of the United States Steel Corporation in the manufacture of iron and steel, while comparatively little notice has been taken of this quiet absorption of the sources of supply for the trade. We have not space here to dwell on the great importance of this question. The influence of the Corporation has heretofore been exercised in a way which has been really beneficial to the trade, but the control of the raw materials of a branch of manufacture which is absolutely essential to national industry and prosperity by a single management is a matter of very grave public concern. Should this control fall into unworthy hands—which is always a possibility of the future—the consequences might be disastrous to the public welfare.

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FOREIGN CAPITAL IN RUSSIA.

The committee of the Vladivostok Stock Exchange has addressed a petition to the Imperial authorities at St. Petersburg asking for a removal or modification of the existing regulations, which practically prohibit foreign industrial undertakings, and especially mining enterprises, in the coastwise districts of Siberia and Manchuria. The petition points out that the regulations are a practical barrier to any development of the mineral resources of the region, inasmuch as the Russians themselves do not interest themselves in the matter. Complaint is made also of the arbitrary and unreasonable manner in which special concessions have been made to certain

wealthy foreign syndicates. A powerful French syndicate recently applied for a concession to work the extensive coal-fields in the neighborhood of Vladivostock. This was refused, but was granted afterwards to an English company trading under the Russian flag. Many foreign syndicates have sought concessions for the exploitation of the silver and lead deposits lately discovered in the Ussuri region; but they have been confronted by these prohibitive laws. What the country requires, the petitioners urge, is complete freedom of operation for foreign capitalists, engineers, practical miners, and, above all, foreign brains and energy. It is characteristic of Russian management that the distant mines of Eastern Russia are under the control of a commission at Irkutsk having no knowledge of local conditions.

These complaints do not surprise us. Under the bureaucratic administration of mining affairs in the Russian empire it is difficult to get a concession except through favor, and when foreign capital secures an opening it finds it much easier to get into an enterprise than to control it afterwards. At intervals we hear enthusiastic accounts of the mineral wealth of Siberia and engineers unused to the ways of the Russian official commit themselves to enthusiastic suggestions of investment in that region; but those who have operated mines amid the harrassing restrictions and impediments of a worn-out official system are less apt to see the advantage of expending American and English capital in these distant parts. This is the great stumbling block to the mineral development of the vast empire which stretches across two continents, and as the Russians themselves are not keen to do the work it is not likely that it will be done in the immediate future, unless better security is offered to the enterprising men of other countries.

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MARKET CONDITIONS.

There is little new to report in the metal markets this week, the good demand and steady prices being general.

Copper continues to improve and this week again shows a slight advance in quotations. Buying in this country continues strong and the demand from abroad is reaching figures which were hardly expected at the opening of the year. In the absence of the statistics of the Copper Producers' Association, for January, which we should receive about this time, it may be fairly assumed that production is holding its own. Copper for short deliveries continues rather scarce.

Tin remains somewhat unsettled, the speculative element in this article being strong, as has been heretofore explained. There is no change in consumption, but buyers seem to be holding off a little in view of the higher quotations.

Lead is quiet as usual and without any change in prices. Spelter continues rather strong, but without material change.

Silver has been quiet, although buying for India has improved somewhat. The reports from that country indicate that the coin reserve of the Government is getting rather low, and it is surmised that before very long the India Council will be in the market for some silver for coinage purposes. This expectation is serving to maintain the price of the metal.

A disposition to wait on contracts for the second half of the year still characterizes the iron market, although it is difficult to see for what buyers are waiting, since, as we have heretofore remarked, the present advantage seems to be entirely with the sellers. The production of pig iron is still reduced to a considerable extent by difficulty in transportation and the short supply of coke at the furnaces. In spite of the efforts of the railroads, matters do not improve very much, and there seems to be no prospect of an immediate end of the trouble.

English market reports note some heavy buying of Middlesboro foundry iron, with smaller orders for Cumberland hematite, or bessemer pig, which have recently been placed on American account. There seems to be a prospect of an increase rather than a decrease in imports of iron here for the next two or three months.

In finished material the pressure for structural iron seems to be increasing. There is also a considerable demand developing for girder rails and other material for electric railroads. It will be difficult, however, for late comers to secure deliveries which will enable them to do much work during the coming summer.

The Western coal markets show a slight improvement, supplies at large consuming points being better. There is still much trouble in transportation, however, and much complaint about delays in delivery.

In the seaboard bituminous trade prices are down nearly to the regular figures and the market is quiet. A large tonnage has arrived from abroad recently, particularly at ports beyond Cape Cod, and the demand for domestic coal in that territory is limited to contract business. Domestic producers are still hampered by poor car supply.

In the anthracite trade the blizzard of last week reduced the production and interfered with shipments considerably, but not enough to affect the market at seaboard points, although on the lower lakes and in Chicago territory the supply was reduced, and the price is firmer. A large tonnage of coal is now going from the mines.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

EUTECTIC OR BENMUTIC.

To the Editor:

Sir.—The fact that with the development of metallography the nomenclature is becoming more and more involved, induced the Council of the Iron and Steel Institute to appoint a committee to consider the matter and to ascertain whether it would be possible to take steps to make the terminology less complicated and more precise. The committee drew up a glossary, which was published in the *Journal* of the Iron and Steel Institute (1902, No. 1, pages 90-119), and it was hoped that it would tend to promote the unification of terms, the simplification of those used and the elimination of many of them. It is not, however, to be expected that the compilation of this glossary will prevent the introduction of new terms, and if the convenience of the new terms is so great as to outweigh all objections it is obvious that they deserve to be generally adopted. The well-considered proposal made in your issue of January 24 by so eminent an authority on metallography as Prof. Henry M. Howe, that the new terms "benmutic" and "osmondite" should be introduced, deserves, therefore, the most careful attention. In my opinion, however, the former of these is unsatisfactory from a philological point of view, inasmuch as the Latin prefix "bene" can only become "ben" before a vowel, and as the termination "-ic" is Greek, "benemutable" would be more correct, but undoubtedly ugly. I question whether "bene" is ever used in this sense, nor do I know of any Latin prefix so employed. "Eu" in Greek is so used again and again, and "eutectic" has a classic Greek word corresponding with it. It seems therefore that Greek cannot be avoided, and evidently "eu" is the right prefix, and "ic" which means "capable of," the right termination. What Prof. Howe should find is a suitable Greek word to represent transformation. There is, for example, the word *alloioo* (ἀλλοιοω) to make different, which has an adjective *alloiotikos*—changed or changeable—used by Aristotle. This would give the passable word "eualloiotic." The alternative would be to take one of the many compounds of "meta," meaning change. Aristotle uses *metablatikos*, able to produce change or subject to change. This gives "eumetablatic." Prof. Howe's "eumetamorphic" is correct, though cumbersome. "Eumetaplastic" sounds better, but rather has the idea of easy to be remoulded.

To the second term "osmondite" proposed by Prof. Howe there can be no possible objection. Indeed, it would be a most gratifying if the name of the greatest exponent of metallography were represented in the nomenclature of the subject.

BENNETT H. BROUGH.

London, Feb. 10, 1903.

ORE IN SIGHT.

To the Editor:

Sir.—I was very much interested in an article by Mr. Philip Argall, in your issue of February 14, in regard to the use of the term "ore in sight." What Mr. Argall has to say is very much to the point, and quite agrees with my views upon this subject.

I would use the following terms to qualify and more fully explain the purely general expression of "ore in sight":

1. Positive Ore.—Ore exposed on all sides.
2. Probable Ore.—Ore exposed on two or three sides.
3. Possible Ore.—Ore below the lowest level, or, as Mr. Argall expresses it, "below the last visible ore."

The use of these three simple words is recommended to engineers.

BENJ. B. LAWRENCE.

New York, Feb. 21, 1903.

THE SAMPLING OF ORE IN A MINE.

To the Editor:

Sir.—I have been much interested in your articles on the systematic sampling of mines. May I contribute a few remarks upon the *un-systematic* sampling of mines in order to point out that, like all other good methods, systematic sampling has its limitations.

That these limitations are not generally recognized is indicated by the fact that certain large mine investment companies are reputed to go so far as to formulate rules by which their scouting engineers are bound. Two such rules I have encountered more than once and they are substantially as follows:

1. No ore shall be considered as "in sight" unless it can be sampled at regular intervals on at least three sides.

2. A purchase is not to be recommended unless there is a fixed percentage of the purchase price in sight.

Now, I think, the making of any such rules as these is open to criticism from a business standpoint. They are not conducive to the acquiring of good mining investments. I can, in fact, recall an instance where a good opportunity for a profitable purchase was lost in this way, and I have no doubt many of my readers can recall others.

The scheme of systematic sampling is based on the idea that mineral deposits occur in definite and meas-

urable shapes, as, for instance, a fissure vein or a mineralized stratum, but we know from experience that a very large percentage of all mineral deposits are most irregular in shape and size, and in such deposits it seems to me that systematic sampling is apt occasionally to be actually misleading. By systematic sampling I mean the taking of samples across the lode at regular intervals on all the accessible drifts and entries with a view to figuring out the ore in sight from the measurements and assays thus obtained.

That there are limitations to this system can be shown by recalling a few irregular ore-bodies. Take, for instance, the Richmond Mine at Eureka, Nevada, the Copper Queen Mine at Bisbee, Arizona, or the Cortez Mine at Cortez, Nevada, all of them mines which are identified with bodies of great value and magnitude, but of such erratic form that I cannot see how the ordinary methods of sampling could be applied at all; or consider the countless silver-lead deposits which occur as connected, or partially connected, chambers in limestone. How, may I ask, is one to figure the ore in sight according to rule, in such cases?

Adopting Mr. Phillip Argall's very valuable suggestions as outlined in your paper of February 14, and applying them literally, one could figure no "ore developed" in this class of deposits. Even blocks developed on four sides are like as not to be solid country rock in the center, and yet, in mines of this class there are frequently hundreds of feet of development with ore on from one to four sides of the passages. It is obviously most unjust to say this is all ore "being developed" or ore "expectant," and it should not be forgotten that these pockety and irregular deposits have contributed very largely to the world's supply of metals, and have produced some phenomenal dividend payers. It seems to me that, in cases of this kind, rules must be in a large measure disregarded and the value of the engineer's report will depend entirely on the *man* and not on the *system.*

Take again the matter of outcrops; gold outcrops often assay more, and the outcrops of silver, lead or copper veins often assay less than the average of the shoots beneath. The outcrop of the famous Nacozari Copper Mine was a large mass of iron gossan, showing only a little copper carbonate here and there. The big copper mines at Cananea presented a similar appearance on the surface. Obviously, in cases of this kind the judgment must be guided much less by sampling than by mineralogical and geological indications.

What alternative is there to take the place of systematic sampling? The question is hard to answer, except in a general way that the method of sampling must be fitted to the individual case. Mines are such unsystematic things at best that no two will stand exactly the same treatment, and as I said at the outset, this contribution is intended to accentuate the limitations of systematic sampling, and it is obviously impossible to prescribe any system for a procedure which is essentially *un-systematic,* but I will give two examples which I hope will illustrate my point, and I can show that even in those cases where systematic sampling fails us there are still avenues of procedure which, if they fail to give the concise data which are desirable, do at any rate provide a way by which a fair estimate can be made of a mine. In both cases the examintions were made by mining engineers who take the highest rank in the profession.

The first case was that of sampling a large gold mine in Mexico. The engineer spent two days poking around the mine with a sampling pick, studying the vein and the ore-occurrence. He put in the evenings studying the shipments and acquiring general information concerning the conditions of the locality. Now, in studying the vein he found that there were three or four distinct kinds of ore exposed in the workings and his wide experience in such matters enabled him to make a close mental estimate of the respective amounts, of such ore in sight, so it only required a few samples of each kind of quartz to give him, at one stroke, data from which he could form a very fair estimate of the mine. These samples were taken and assayed under his directions, and I know that the returns from them led him to a correct opinion of the mine; for, although he at once proceeded to sample the mine in a systematic manner, the vein being one which yielded itself readily to such an operation, and although he and I kept in touch with the mine until its decline, he never had occasion to change his opinion.

The above example shows how a man gifted with good judgment can get at the facts without systematic sampling, but it is also an example of the fact that no thorough engineer will ever neglect so valuable an aid as systematic sampling wherever such a method is at all applicable. By treating the various mineral constituents of a lode we find a way, hardly a system, by which much valuable information may be gained. Every mine shows different kinds of ore, and very often they are of such a nature that having once educated the eye, by assaying the various kinds, it is entirely possible to distinguish the different grades on sight. In deposits of very erratic shape the information to be gained in this way may be very considerable and may lead to a comprehension of the deposit which will facilitate systematic sampling afterwards.

The second case was that of a large copper-silver deposit which I sampled with the other of the two engineers previously alluded to. Here the ore-bodies left standing were so shapeless that the ordinary methods of sampling and measurement were utterly useless. He went at once to the pith of the matter by taking a few general samples, examining them carefully and separating them by concentration into their constituent parts, namely, clean concentrates, middlings, slimes and tailings. These various parts were each carefully inspected, accurately weighed and assayed, and with the knowledge gained thereby he was able to go through the mine and decide correctly, not only as to what was ore and what was waste, but he could pass upon the concentrating qualities of the material. This method of sampling showed the instincts of the metallurgist. The location of the mine was such that concentration was the only practicable treatment. Like the last example, this was a case of educating the eye, but it differed in that the eye was educated to read in values and percentages of concentrates as well as in values of crude ore. To this experienced metallurgist it was a useful "short cut" to results, but, like all short cuts, I imagine it might be dangerous to a beginner. The question of structural geology was also interesting in this case. The owners considered the deposit a large chimney and worked it with the idea that the ore went down, found it did not go below a certain level, let the mine partly fill with water and put it on the market with the usual tale of inadequate pumping machinery. The deposit proved to be a large anticlinal fold with the axis dipping slightly to the east. There was more ore and more water in the eastern part of the mine than anywhere else, and the chance that the ore might continue along the axis seemed tempting enough to justify a little work. This interesting question, however, has not been completely solved as yet.

Another case will serve to illustrate my theme. I lately investigated a large low-grade deposit in Colorado. The lode is a brecciated band, in a schist country, about 200 ft. wide and two or three times as long. In this case also the structural geology is far more interesting and vital a question than the sampling, but as this is an article on un-systematic sampling I will speak only of the conditions which affected that part of the work. The brecciation was complete and coarse; by this I mean that large open spaces had been formed as would occur in a pile of rocks. Some of these spaces were filled nearly solid with chalcopyrite which carried $35 in gold per ton and many others had only a little chalcopyrite, the remainder of the filling being a loose sinter, and both it and the schist contained very little of value. In fact, 50 per cent of the values lay in these nodules of copper pyrite. As the mine had been worked by lessees it was only natural that the surfaces exposed underground were destitute of copper nodules. Here was a case where systematic sampling with a moil and hammer would result in error, but where the method of taking samples by car-load lot and shipping the same to the smelter would give useful information.

I cannot resist the temptation to say a few words in regard to the method of sampling "by car-load lot." One cannot but feel a little cheap and inefficient with a sackful of carefully reduced little samples all carefully tied up and sealed when confronted by the man who believes in "Sending a car-load to the smelter and *getting your money for it.*" Somehow this sending a car-load to the smelter and *getting your money for it* has such a grand and practical sound to it, that it impresses people. But let us follow the car-load to the smelter and see what is done with it. Do they take a nice, clean furnace and smelt that car-load separately and weigh up the values from the results? Oh, no; they just put it through a sampler, which often is none too clean or too carefully handled, and reduce the car-load to one little assay sample. It is a noticeable thing also that the man who believes in taking his samples by the car-load is generally the same man that believes in hand-sampling at the smelter in preference to machine sampling. So that the man who does his sampling by car-load lots does his *buying* on *one* assay sample while the other man does his buying on the results of many dozen assay samples, and, I believe, that each one of the many may be made as truly representative as the machine-sampled car-load.

I have just shown an instance where car-load sampling was needed, but in the majority of cases, I think, the sampling by hammer and moil is preferable, because it can be made to yield, not only the average value of the ore in a given block of ground, but the quantities and qualities of the various grades as well.

I hope that I have succeeded in calling attention to the fact that systematic sampling is only one of many tools at the engineer's command. Just as the skilled mechanic uses now one tool and now another, when the work before him changes, so the engineer may find it advantageous to vary his methods.

GEORGE J. BANCROFT.

Denver, Feb. 17, 1903.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Without speculation there is no good and original observation.

Darwin said that geology was "an excellent science to begin with, as it requires nothing but a little reading, thinking and hammering." That is all any science or industry needs—and it is a great deal!

The constant widening of the intellectual field has indefinitely extended the range of that especially human faculty of looking before and after, which adds to the fleeting present those old and new worlds of the past and the future, wherein men dwell the more the higher their culture.

The scientific man accepts his limitations and does not expect to arrive at absolute verity. He observes, and when he has advanced far enough to begin to generalize, he formulates his ideas as an hypothesis to serve as a basis on which to work until some one has suggested something better.

Within a finite time past the earth must have been, and within a finite period of time to come the earth must again be, unfit for the habitation of man as at present constituted, unless operations have

been, or are to be, performed which are impossible under the laws to which the known operations going on at present in the material world are subject.

A temperature of —60° to —80° F. is not dangerous to human beings who are adequately clothed, if the air is still, while thirty or forty degrees higher, if accompanied by a gale of wind, would kill every living thing before it. Very low temperatures almost invariably coincide with perfect atmospheric quiet.

Copper melts at about 2,000° F., or 1,093° C. When it is heated within two or three hundred degrees of its melting point, it becomes brittle and friable, and may be actually pulverized.

When copper is fused it possesses a sea-green color. Molten copper has the property of absorbing certain gases, such as hydrogen, carbonic oxide, sulphurous acid, etc., which it sets free again on solidifying. This causes serious difficulties in making castings, and requires the employment of special precautions to prevent porosity.

The reverberatory copper furnace, with its neutral atmosphere, produces a richer matte from the same ore-charge than a blast-furnace which has a powerfully reducing atmosphere.

The separation of matte and slag depends mainly upon the difference in their specific weight. Hence, it is difficult to keep the copper low when basic, ferruginous slags are produced, while an earthy or siliceous slag is usually very free from grains of matte.

In 1878 the reverberatory copper furnaces at the Argo Smelter, Denver, had a hearth 9 ft. by 14 ft., since then they have been developed to dimensions of 16 ft. by 35 ft. The capacity of these furnaces increased from 12 tons to over 50 tons per 24 hours.

The first vessel to navigate the Great Lakes was the *Griffon*, built by La Salle and his party in 1679, near the site of the present city of Buffalo, on Lake Erie. The *Griffon* was about 50 tons burden, and carried La Salle, with 34 men and five guns, safely from the point where she was built to Mackinac and thence to Green Bay. She started to return with a cargo of furs in the following year, but was lost, probably in Lake Huron. From the 50-ton *Griffon* to the 7,500-ton iron-ore carrier of to-day is a long step.

One of the recent purposes for which aluminum has been employed is in the making of grindstones, on account of the property which it possesses of forming under the whetting action a very fine mass which adheres strongly to steel. An examination under the microscope shows the edge of the steel to be perfectly uniform and unbroken, which is not the case when steel is sharpened on stone.

Lecturing recently at Newcastle-on-Tyne, on English and American railways, Mr. Wilson Worsdell said the average life of a passenger express locomotive in England was 25 years, of a freight locomotive 26 years, of a local passenger engine 25 years, and of a switching engine 27 years. The mileage of a passenger express engine on the English lines was anything from 700,000 up to 1,000,000 miles, for a freight engine from 500,000 to 800,000 miles, for a local passenger engine from 500,000 to 800,000 miles, and for a switching engine from 500,000 to 800,000 miles. In America the average life of an express passenger locomotive was 18 years, of a freight locomotive 16 years, of a local passenger engine 19 years, and of a switching engine 22 years. Whereas the mileage of an English express locomotive was only at the outside 1,000,000 miles, in America it was up to 2,000,000 miles in the 18 years, as against the 25 years in England, which illustrates the difference in methods.

THE NEW PRESIDENT OF THE INSTITUTE.

The personality of the president of the American Institute of Mining Engineers is of interest to the profession at large because the Institute as an organization stands for what is collectively best in the great band of men who direct the mining and metallurgical industries. At the recent annual meeting at Albany, Dr. Albert R. Ledoux was chosen president for the ensuing year, in succession to Mr. E. E. Olcott, who has so worthily filled this honorable office for two successive terms. The professions of mining and metallurgy have been fortunate in being represented in turn by men of such high character. Both, it so happens, owe their early training to the Columbia School of Mines, and we felicitate that great institution in being able to lay claim to these two, among the great number of capable men which it has sent out sa exponents of American engineering practice.

Albert Reid Ledoux was born at Newport, Kentucky, November 2, 1852. His father was the Rev.

DR. ALBERT R. LEDOUX.

Louis Ledoux, D. D., who married Katherine C. Reid, of New York City.

After his preliminary studies he received a technical training at the School of Mines of Columbia University, in the city of New York, where he studied from 1870 until 1873. After that he studied in the University of Berlin, Germany, from 1873 to 1875, then at the University of Goettingen, Germany, where he graduated with the degrees of Master of Arts and Doctor of Philosophy. Dr. Ledoux subsequently received the honorary degree of Master of Science from the University of North Carolina. From 1876 to 1880 he was the North Carolina State Assayer, a member of the faculty of the State University and of the State Board of Health.

In 1880 he came to New York City and began the active practice of his profession as a consulting engineer, metallurgist and assayer. For two years he was the expert of the New York Electric Subway Commission, which had charge of the burying of the electric wires.

Besides the Institute, Dr. Ledoux has been elected, at various periods, a member of most of the prominent scientific societies, including the German, English and American chemical societies, the Society of Chemical Industry, the American Association for the Advancement of Science, the American Institute of Electrical Engineers, the Society of Medical Jurisprudence, and the Canadian Mining Institute. In his profession he has been retained as consulting expert by some of the largest corporations, including the Great Northern Railway, the Great Northern Mining and Development Company, the New York Linseed Association, etc., etc.

For the past ten years the business of which Dr. Ledoux is the head, has been conducted under the firm (and later incorporated) name of Ledoux & Co., which handles a very large proportion of all the ores and metals which are sold to refiners on the Atlantic seaboard or exported to Europe. Dr. Ledoux is recognized as a specialist in the mining and metallurgy of copper, and is quoted as authority on its statistics.

Dr. Ledoux has been for six years the United States receiver of the Harney Peak Tin Mining, Milling and Manufacturing Company, a corporation once famous for its influence in securing tariff legislation in favor of the American production of tin, and the owner of large tracts of land in South Dakota, upon some of which tin has been found. He is also president and director of the Great Northern Mining and Development Company, director of the Assurance Company of America, vice-president of the National Standard Fire Insurance Company, director of the Paseo Company, and of other corporations. He is a member of the Down-Town, City, and National Arts clubs, and of the Scientific Alliance, New York City.

This enumeration suggests the great activity which has throughout characterized the career of Dr. Ledoux. A fortunate combination of business sagacity and scientific knowledge, vitalized by untiring energy, has made him typical of the American technical man—the exponent of the forces making for all that is good in that nice adjustment of human affairs which we term modern civilization.

THE ALBANY MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

The opening session of the Albany meeting was held on Tuesday evening, February 17th, in the hall of the Albany Institute and Historical Society. After an address of welcome by Mayor Gaus and a brief reply by President Olcott, the president then read a short note on the life and character of the late Abram S. Hewitt. He closed by reading the following telegram from Dr. Raymond from Sicily: "Best wishes for the Institute and the Albany meeting. I regret especially my inability to express personally my love for Mr. Hewitt's character. May the inspiration of his life rest upon us forever." Dr. A. D. V. Raymond, of the Union College, Schenectady, then made a few remarks concerning Mr. Hewitt. The tribute to Mr. Hewitt was closed by the reading, by Dr. A. R. Ledoux, of Dr. Raymond's note on Mr. Hewitt, prepared by him while in Sicily.

Mr. Howard W. Du Bois, of Philadelphia, presented, with appropriate remarks, a number of beautiful lantern slides, illustrating the scenery, camp-life and glaciers of British Columbia. After the session adjourned an informal reception was held in the halls of the building, about 150 people being present.

On Wednesday, February 18th, the entire day was devoted to an excursion to Schenectady, where the works of the General Electric Company were inspected, the entire plant being thrown open to the visitors.

On Thursday, February 19th, in the morning, Governor Odell received the members of the Institute, welcoming them with an appropriate speech which was responded to by President Olcott. The members then visited the Senate and Assembly chambers, the Library, the Museum and the rooms of the State Geological Survey.

In the afternoon a business session was held. The president announced the death of Mr. W. J. Taylor, an old member of the Institute. Following this, Mr. F. O. Blackwell, of Schenectady, read a paper on "Power Transmission in Mining," setting forth the advantages claimed for electricity over compressed air. A paper on "Present Electrical Equipment of the Anthracite Coal Field," by H. H. Stoek and G. W. Harris, of Scranton, was presented in abstract.

It was accompanied by a number of lantern slides showing the motors, pumps, hoists, breakers and other machinery. Mr. W. B. Clarke, of Schenectady, read a paper on "Electrical Apparatus in Coal Mining."

On Thursday evening the annual subscription banquet at the Ten Eyck Hotel was attended by 95 members and guests. Capt. R. W. Hunt was toastmaster and speeches were made by President E. E. Olcott, the Rev. Walter W. Battershall, Messrs. Louis E. Carr and Danforth E. Ainsworth, and Dr. A. R. Ledoux, whose election as president had been announced.

At the opening of the session on Friday morning, February 20th, the election of the following officers for the ensuing year was announced: President, A. R. Ledoux, New York; vice-presidents, John Markle, Jeddo, Pa.; Philip W. Moen, Worcester, Mass.; James F. Kemp, New York. Managers, Heinrich Ries, Ithaca, N. Y.; B. B. Lawrence, New York; F. Klepetko, Butte, Mont. Treasurer, Theodore D. Rand. Secretary, Rossiter W. Raymond. Assistant Secretary Dwight read the annual report, which showed an addition of 300 members during the past year, the total number now being about 3,300.

After this business had been disposed of, the discussion of Mr. Clarke's paper was taken up by Mr. Saunders, who was not willing to accept Mr. Clarke's statement as to the higher efficiency of electric power as compared with compressed air. Mr. Saunders discussed this question at length and pointed to the fact that nothing had been secured to replace the air-drill, which must always retain its supremacy.

Mr. R. V. Norris, of Wilkesbarre, Pa., then gave abstracts of his papers on "Cost of Pumping at Short Mountain Colliery," and on "Water Hoisting in the Anthracite Region." Dr. A. R. Ledoux then read a paper on "Accidents Due to Combustion within Air-Compressors." This was followed by some remarks on the same subject from Mr. Saunders. Mr. Anson G. Betts read a paper on "Refining of Lead by Electrolysis." Mr. Verplanck Colvin gave an abstract of papers by him on the "Magnetic Declination in Northern New York between 1768 and 1900," on the "Measurement of Base in Mountain Districts," and on the "Original Wooden Compass used by the Colonial Surveyors in New York in 1752."

On Friday afternoon the members of the Institute visited the Watervliet Arsenal and witnessed the shrinking of a jacket on a 10-in. gun. On Friday evening a session was held at which papers were read by Mr. Chas. W. Dickson, on the "Sudbury Ore Deposits," and by C. E. Parsons on the "Spier Falls Power Plant." The latter paper was illustrated by lantern slides showing the conditions under which the dam was erected.

On Saturday the meeting was closed by an excursion to the Spier Falls plant, near Glens Falls, in which a number of the members joined. Some of the members also visited the works of the Helderberg Cement Company, near Howe's Cave.

COAL FROM THE FAROE ISLANDS.—A Copenhagen correspondent of the London *Colliery Guardian* states that the steamship *Mjolnir* has begun to unload there the first cargo of coal obtained from the mines at Trangisvaag, in the Faroe Islands. The *Mjolnir* used it on her voyage home, and the engineer declared that he was highly satisfied with it. It merely required more draft than British coal. The new coal is to be tried by the Danish Navy, railroads and gasworks.

IRON AND STEEL PRODUCTION IN BELGIUM.—The preliminary official report, just issued, shows that the output of pig iron in Belgium for the second half of 1902 was 559,420 metric tons, an increase of 172,220 tons over the second half of 1901. The production of wrought or finished iron was 192,500 tons, a decrease of 10,430 tons. The make of steel ingots was 423,430 tons, an increase of 147,980 tons; of steel in finished forms 397,710 tons, an increase of 127,500 tons.

THE LIGNITE MINES OF NORTH DAKOTA.

By FRANK N. WILDER.

The first mining of North Dakota lignites was done in 1880. The Government reports exhibit a slow increase in the output from that time till 1890; since then the increase has been rapid. The output since 1895 has been as follows:

	Tons.		Tons.
1895	38,997	1899	98,809
1896	78,050	1900	129,883
1897	77,246	1901	166,601
1898	83,895	1902	296,800

The value of the output for the year 1902 is about $500,000. Twice this amount could have been sold during the past year had the mines been capable of producing it. Surface equipment was sufficient for a greater output, but underground work has not progressed far, so that the output was limited at a time when the demand was extraordinary, on account of the disturbed conditions in the East. The output for the year 1903, it is reasonably expected, will be worth $1,000,000. The rapid development, lately, of the lignite mines can be accounted for in two ways. The population of North and South Dakota and western Minnesota is increasing rapidly. The census returns show that in 1860 the Dakotas together had a population of 4,837. The increase since then is shown by the following table: 1870, 14,177; 1880, 135,177; 1890, 511,527; 1900, 720,716. Since 1900 the increase has been marked, the immigration coming largely from the west-central States, chiefly Iowa and Illinois. Freight rates on coal in the Dakotas average more than half a cent a ton per mile, as Montana coal is not brought into these States except for railroad use, and the native lignite usually furnishes a much cheaper fuel than Eastern coal brought by way of Duluth.

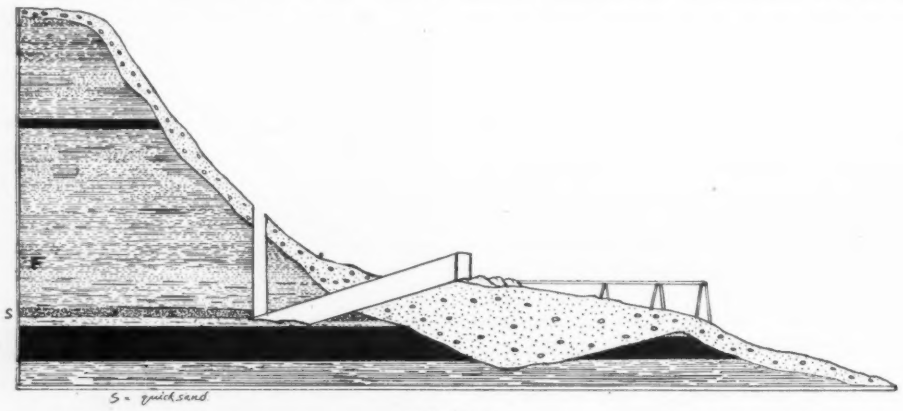


FIG. 1.

A second factor in the development of the lignite industry is the more intelligent way in which it is used. The methods of burning lignite have been discussed in an earlier paper.[1]

Mining is conducted in three ways: by stripping off the overlying clay and glacial drift from beds that are but slightly covered along streams; by drifting in on the seam; and by sinking shafts, both vertical and inclined. Most of the banks where lignite is now won by stripping, will, as the stripping grows heavier, develop into drift mines.

Lignite outcrops are so abundant in the western part of the State that probably a third of the tonnage is secured by the simple process of stripping. The only equipment required is a scraper, team and pick, and operations are carried on in the winter when the farmer has spare time. There is a coal bank within ten miles of nearly every settler in the western part of the State, and the farmer puts up his winter's coal as regularly as he does his hay.

The larger mines in the northern part of the State drift in on beds that outcrop low in the valley of the Mouse River and its tributary, Des Lacs. Entries are extended on the coal, or begun a few feet above it and slope down at an angle of 10 or 15° until they meet the coal. In one instance this practice has involved serious difficulties. The mine of the North Dakota Lignite and Brick Company, situated near Minot, encountered a bed of quicksand, which lies a few feet above the coal, but separated from it by sufficient clay, so that the quicksand does not interfere with the security of workings that do not tap it. This mine is illustrated in Fig. 1. The New Era Mine, which is trying to reach this same bed by a vertical shaft 300 ft. deep, some distance back on the prairie, has encountered the same quicksand, and in view of the constant pumping which will be demanded, it is not clear how it can compete with the mines which follow the coal directly from its outcrop in the Mouse River Valley, and are not troubled with water. At the Washburn Mine, 60 miles north of Bismarck, the mine entry slopes at an angle of 23° until it reaches the 12-ft. lignite bed, only 60 ft. below the surface.

Drilling machines of standard patterns are in use in three of the lignite mines, and most of the mines now being opened will be equipped with electric machinery. The lignite is free from concretions and iron; no foreign substance hinders the successful operation of undercutting machines, which operate in lignite as readily as in bituminous coal. Labor in North Dakota is higher priced and more uncertain, on account of the special inducements offered to men during the harvest season, and for these reasons the introduction of labor-saving machinery is especially advantageous. Where the lignite is very firm, "shooting from the solid" is effective, especially in thick beds, and the economy secured by the use of undercutting machines is reduced. The lignite in a single mine at times varies in this respect so that at points undercutting machinery is particularly serviceable, while at others it affords no saving.

Generally from 6 in. to 1 ft. of lignite are left for a roof. In view of the scarcity of timber and the abundance of coal this plan proves more economical than to timber the mine. In most mines no timber is used except at the mouth of the entry. In one or two instances the overlying clay is firm enough to furnish a roof and all of the coal is removed. In no instance is there solid rock for roof or floor. In one or two mines the under-clay shows a tendency to pinch up and close the entries, so that the roofs of those that are in constant use must be dressed down frequently, while the deserted entries become closed in four or five years. Few mines, however, have experienced this difficulty.

No seams worked underground are so thin as to justify long-wall mining, and the room and pillar method is employed. Instead of the ordinary double entry method, a modification of it called the "butt entry," in which the rooms run off directly from the main entries, is commonly used. The size of the rooms and pillars varies with the thickness of the coal, and in general, the practice in the lignite does not vary from that in bituminous coal.

Lignite is usually free from dangerous gases of all sorts, and but one accident has occurred that was attributed to them. This was an explosion of firedamp in a Ward County mine.

Some of the lignite seams are entirely free from water, and at all of the mines now in operation the amount of water is moderate. Drainage conditions must be carefully considered in locating mines in the lignite, however, for the coal, lying between beds of

[1] In the issue of February 7. Pages 222 and 223.

impervious clays, is a natural watercourse, if once the water gets access to it. Deep coal seams reached by shafts are apt to encounter difficulties for this reason, though it is probable that many seams will be found dry.

The mines in the northern part of the State are situated close to the eastern edge of the lignite area, in Ward County. All of those now in operation are on the Minneapolis, St. Paul & Sault Ste. Marie Railroad, though the New Era Mine, just started, is on the Great Northern. The mines on the "Soo" road begin with the Davis or Mouse River Lignite Company's mine just north of Minot and continue along the railroad to Kenmare, near which town is a group of seven mines. All of the mines on the Soo Railroad drift in on beds that outcrop low in the valley of the Mouse River and its tributary, Des Lacs. The New Era Mine on the Great Northern Railroad is trying to reach one of these several miles back on the prairie by a vertical shaft, which, to reach the coal, must be 300 ft. deep.

The mines at Kenmare work a bed that varies in thickness from 4 to 7 ft. The leading facts in regard to the mines of this district and elsewhere in Ward County are summed up in the following table:

Ward County Mines.

Mine.	Men employed.	Yearly output in tons.	Value of equipment.
Carroll Bros.	10	6,000	$2,500
Dakota Lignite & Brick Co.	Just opened.		
Diamond Mine at Kenmare	10	8,000	4,000
Des Lacs	Not yet in operation.		
Des Lacs Valley Coal Co.	7	3,000	1,000
Des Lacs Coal & Brick Co.	8	4,000	2,000
Electric at Kenmare	20	20,000	25,000
Kenmare Hard Coal	15	15,000	3,500
Mouse River Lignite Co.	35	35,000	20,000
Smith-Kenmare	10	6,500	2,000
Smith-Jones at Kenmare	4	3,000	2,000

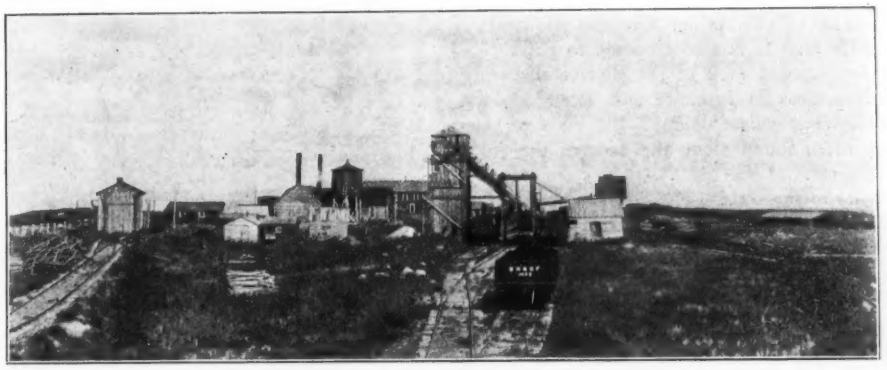
In the southern part of the State there are three large mines, tributary to the Northern Pacific Railroad. The largest mine in the State, the Washburn Mine, is located at Wilton, 70 miles north of Bismarck. The equipment and development work of this mine are valued at $100,000, and its daily output at present is nearly 1,000 tons. The owners propose to double the amount of their investment during the coming summer. The coal forms a bed from 8 to 13 ft. thick, and lies 60 ft. below the surface. From 6 to 8 ft. of the seam are mined, the rest being left for a roof. Very little timbering is done except at the mouth of the entry. Mining is carried on by the room and pillar and "butt entry" method, with rooms 17 ft. wide, and 14 ft. pillars. In a room a single row of wooden posts supports the roof. Ten acres have been mined up to December, 1902. About 10,000 gals. are pumped daily, but here, as at most points in the lignite area, all of the water pumped is used profitably. At present six Jeffrey undercutting machines are in use. For shooting, picking down and trimming rooms miners have received during the past winter from 30 to 40c. per ton, and 5c. more for the same work in entries. The coal is brought to the surface by a Jeffrey elevator, which raises it from the bed 60 ft. below ground, to the top of the tipple, from which it passes down shoots and over screens into cars on a side track. An Ottumwa box-car loader is employed. The mine is ventilated by two 30-in. and one 100-in. fans, the latter being installed on the surface.

The two mines of the Consolidated Coal Company are located west of the Missouri River, on the Northern Pacific Railroad. Their New Salem Mine is only 40 miles west of Bismarck, however, and is in a fair position to compete for trade in the eastern part of the State, while their mine at Lehigh, though 100 miles farther west, is operated under other conditions so favorable as to make up for loss due to its position. Both mines drift into seams that are exposed in shallow valleys. At New Salem a 6-ft. seam is mined, all of which is taken out, the overlying clay forming a substantial roof. No mining machinery is used, and work is done by the piece, the men receiving 60c. per ton for room work and $2.50 per yard for running entries. The mine is perfectly dry. Its present daily output is 100 tons. The Lehigh Mine takes coal from a bed 14 ft. thick. Entries are 12 ft. high and from 10 to 20 ft. wide. The visitor on going through them is reminded of a great cave rather than a coal mine, for practically no timber is used in the mine, and the coal left for roof forms a great symmetrical arch. Rooms are cut 20 ft. wide, and are separated by 6-ft. pillars. The miners are well paid at 40c. per ton for room work and 60c. for entries. All hauling is done by large horses, and as the entries are practically horizontal a single animal brings to the surface a train of cars carrying three or four tons.

As was shown in the introductory paragraphs, the prospects for the North Dakota lignite mines are good, and although the companies already in the field will be able to increase the output materially next year, there is no immediate danger of oversupply. In fact, the demand promises to increase faster than the supply for some time to come, and the field is an inviting one for investment.

UTILIZING LOW-GRADE FUEL AT THE MINE.

London *Engineering* says that the electric light and power transmission from the Berggeist Central Station, at Badorf, near Cologne, is an interesting exemplification of utilizing a comparatively poor fuel which would hardly pay transport over considerable distances. There is, as is well known, good coal in the Ruhr basin east of the Rhine, and in the Saar basin, west of the Rhine. Apart from this latter occurrence on the extreme south of the Prussian Rhine province, however, no coal proper is found on the left side of the Rhine. But lignite does occur in the Ville, a range of hills keeping about six miles from the left bank of the Rhine. The proprietors of the Berggeist Lignite Colliery, at Badorf, situated about that distance off the Rhine, half-way between Cologne and Bonn, have had the enterprise to add to their colliery an electric central station which supplies light and power to that district, and, in fact, across the Rhine. At Badorf, the lignite, which is mined in open workings, is taken by an electric rope railway of short length direct to the internal furnaces of seven boilers, each having a heating surface of 103 square meters (1,100 square feet). Automatic stokers are employed. Steam is raised at 140 pounds, and passed through a superheater. The engines are condensing vertical compound machines of different powers. A start was made with three engines, respectively of 110, 475 and 900 horse-power; a 1,200 horse-power unit is soon to be added. The engines drive tri-phase generators, yielding currents at 5,700 volts. Two of these dynamos are directly coupled to their engines, the third small dynamo is driven by a belt. A small continuous-current dynamo, two rotary converters, and an accumulator battery serve for excitation and for actuating some auxiliary machinery, pumps, etc. Four underground cables take the high-tension currents to four feeder points at Bornheim, Poppelsdorf, Vochem and Weseling, the connections being such that each point can be fed through at least two cables. The main cables had last summer a length of 50 miles. Transformers supply light in the secondary circuits at 110 or 220 volts, and power at 220 volts. The district is chiefly agricultural and well-to-do. There are 13 factories with motors aggregating 736 horse-power joined to the central station. The maximum charge for light is 12 cents per kilowatt-hour. Power is supplied at about a third of the light rate, the maximum charge being 4.32 cents per kilowatt-hour. For a 7.5 horse-power motor, for example, the horse-power-hour costs 3 cents if the motor is used for 300 hours per month, and 3.4 cents if used for 100 hours. The extension of the circuit over the right bank of the Rhine was effected last September by means of two high-tension cables.



WASHBURN MINE, WILTON, NORTH DAKOTA.

FOLIOS OF THE GEOLOGIC ATLAS OF THE UNITED STATES

The following circular from the United States Geological Survey has been issued for the information of mining engineers, geologists and others interested:

"This circular has been prepared to notify geologists, mining engineers, land surveyors, and others who for business or professional reasons may be interested in the geology or the economic development of regions covered by the folios of the Geologic Atlas of the United States, issued by this office, that the stock of several of these folios has already been exhausted and that only a limited supply of others now remains available. Before the entire stock of these folios has been distributed it would seem to be fair and proper, in the interest of those of our correspondents who are most directly concerned in the subject matter of these publications, to call their attention to the rapid depletion of this stock and thus give them full opportunity to obtain the folios they may need.

"For the information of those who are unacquainted with the general character of the folios it may be stated that they consist of maps showing the topography and geology of the areas covered, accompanied by descriptions of the details of the geology and of the economic resources. Their features are more particularly described in the accompanying circular.

"Those who own property or who intend to invest in land in any of the regions mapped, and want to know whether it contains mineral or other deposits of value, will find the facts briefly and plainly set forth in these folios. School teachers and their students should find them of great service in connection with the study of local topography and geology. To miners and engineers the advantage of using these folios should be obvious.

LIGNITE IN BOHEMIA.—An important deposit of lignite, at a depth of only 160 ft., is reported to have been discovered near Aussig, Bohemia.

MAP OF THE NEW JERSEY ZINC AND IRON REGION.—The United States Geological Survey is about to issue a reprint of the map covering the Franklin Furnace mining region, in northern New Jersey. The quadrangular area represented on the map is located mainly in Sussex County, on the western edge of what is known as the Highlands of New Jersey, a rugged strip of mountainous country rich in iron ores. It was originally surveyed by the United States Geological Survey in cooperation with the State of New Jersey, and forms one of the series of topographic sheets covering the entire State.

THE GOLD-FIELDS OF CALCOENE, BRAZIL.

By MAURICE CLERÈ.

These gold-fields are situated near the headwaters of the Cassipore River, in the territory formerly claimed both by Brazil and French Guiana, but now belonging definitely to Brazil, and forming a part of the province of Sara. The gold region lies about 70 miles in the interior, and communication with the coast is made by a single rail mule-tramway of special design and belonging to a French company, which also owns a license to mine over the best parts of the territory.

The gold-bearing region extends over a territory of about 150 square kilometers, but it is very likely that some other areas, more or less auriferous, will yet be discovered. The first activity in Calcoene occurred in 1893-94. Over 6,000 men came and built their palm cabins and started work along the streams. They were nearly all negroes from the Guianas, with a few Portuguese, Brazilians and Americans. The period of large output lasted about four years, but it fell off suddenly. The population lessened by degrees, and nowadays only 50 to 70 negroes remain there, working in small parties of four or five.

Geology.—The geology of the gold-bearing region is little known. As is often the case in tropical countries, the country-rock is decomposed to a great depth by reason of weathering. Granites and quartzites abound. Diorite is also reported to exist.

In the decomposed rock at the surface there are numerous boulders of hematite and small deposits of pyrolusite (manganese oxide). Big dikes of pegmatite are often found along the beds of the gold-bearing streams.

Occurrence of the Gold.—The deposits are shallow placers of recent formation. They are limited to the actual beds of the streams, no bench gravel having ever been found. The gold-bearing ground appears to be limited to the heads of the several creeks which unite to form the Cassipore River; as they are confined to deep valleys, between the hills, they are narrow and the gravel is very limited in extent, except in certain places down stream, where are found large swamps, not so rich as the upper parts, but covering a wide area.

Most of the creeks have been worked over a good many times, since 1893. They have paid well, but the occurrence of gold has been pockety.

The characteristics of the deposits are as follows: One or two yards of barren clay covering from one to two feet of pay-gravel, lying on the bedrock. The pay-dirt consists mainly of a medium-sized gravel; the boulders are sharp, little rolled and nearly all of white quartz, with some pegmatite. The maximum size is not over 7 inches. The quantity of rolled quartz in the gravel is really remarkable. The bedrock, usually, is a soft clay, probably a decomposed eruptive rock.

The gold of the Calcoene District is minute, often scarcely rolled. Flour gold is abundant. Nuggets have been rare, and always very small. The gold is of the brightest yellow and of high fineness. Quicksilver is employed to catch it.

SLUICE IN THE FOREST, CALCOENE.

Actual Mining.—Some gold is still obtained from the creeks by the ordinary Guianese method. Though the streams have probably been worked three or four times, they yield still an average of 40 to 60 cents per cubic yard; this arises partly from the fact that much gold was lost in the early days on account of the daily fighting over the water supply. Other reasons for a heavy loss of gold are evident in the shortness of the sluices (consisting of only three or four boxes), the clay which is mixed with the dirt so as to retain the fine gold, and finally the hurrying of the sluicing in order to get ahead and start upon new and rich ground. Working so carelessly, the miners left untouched many small patches of virgin ground which negroes to-day are looking for eagerly.

Quartz Veins.—The lodes which were the source of the alluvial gold have not been found. There is no doubt that this gold comes from quartz ledges, the remains of which are found in the shape of quartz boulders all over the country, but it seems that these ledges, very limited in depth, have been entirely destroyed by weathering and washed out.

By tunneling into the hills, quartz ledges have been encountered under the thick cap of surface dirt. These veins contain little free gold, but they carry sulphides, and, rarely, tellurides. Under the bed of Coolie Creek there has been found, between the pay-gravel and a chloritic clay, a layer of broken fragments of quartz, sharp edged and averaging 3 oz. of free gold per ton. A search is being made for the source of this layer of good ore.

ENTRANCE TO LORENZ TUNNEL, CALCOENE.

Alluvial Flats.—Swamps are numerous in this region, especially in the lower valleys. Some of them have been worked by the negroes, but not thoroughly, because of the very slight gradient, the depth to bedrock and the obstacle presented by a sticky clay. The best known of these flats are: Grande Crique, Regina Creek, Clement Temba Creek, Lorenz Creek, the Grand Placer. These areas can be reckoned upon as yielding 20 to 40 cents per cubic yard, including the upper cap. Many flats are as yet untouched, especially those in the vicinity of the old Portuguese Placer.

All those deposits could probably be worked by means of dredges. There are in this region, the writer believes, several million cubic yards of an average value of about 30 cents. The greatest depth to bedrock is 4 yards, the bedrock is almost always soft and can be readily scraped out by the buckets. Boulders are small and easily handled. There are plenty of stumps, big roots and fallen trees in the gravel and the upper clay, but modern dredges are built to deal with them. Water power is not absolutely at hand, but it is to be obtained within 20 miles. Although the country is covered by a dense forest, most of the timber burns with difficulty, so that steam dredges would not prove as economical as those operated by electricity. The writer considers that in Calcoene, dredges of small capacity are to be preferred to larger ones, as there are many flats

of limited area. It seems best to design a bucket dredge, capable of handling 200 to 300 cub. yds. per day of 12 hours, and that can be taken down easily and moved further on. A few creeks, as Regina and Grande Crique, because of their large workable area, would well admit a dredge of much larger capacity. In any case, it has to be borne in mind that the expenses of clearing away the timber will be large.

A NEW NICKEL DEPOSIT IN SAXONY.*

By Professor R. Beck, Freiberg.

The following is to be considered a preliminary account of the new nickel deposit of Sohland, in Lausitz. A description of the deposit by Dr. O. Beyer, which appeared in the *Leipziger Zeitung* of February 13, 1902, was very welcome, Dr. Beyer having been an eye-witness of the first development work, whereas the writer only examined it later.

We here give Dr. Beyer's description of the deposit: Sandy loam, 0.40 meters; brown-colored, partly pebbly, partly loamy, efflorescence of diabase, 2.60 m.; black decomposed diabase, at intervals breaking off in concentric layers, mostly pebbly, with much malachite, green copper, azurite and brown iron ore, 4.00 m.; rock formation in lumps and blocks, with copper pyrite and pyrrhotite between. On the west and east walls the ore appears on the north side at 8 m., the diabase appears, 1.50 m. Gradual disappearance of the diabase lumps and appearance of pyrrhotite, which forms a solid bottom to the shaft, 1.50 m. Total, 10 meters.

TUNNEL AT SANNEMONGON, CALCOENE.

The appearance of round lumps of diabase, or more accurately, protobastite, in the ore-mass is very noticeable. At times fresh spheroids of this rock were to be seen; they had a thickness of 0.25 m.; their shape was partly round, partly obtuse-angled; the interior of these lumps was almost free from sulphide ore, while on the outside there was a covering of copper pyrite, followed by another consisting of copper pyrite and pyrrhotite, and finally an outer layer of pyrrhotite.

It is interesting to note that a secondary enrichment occurs in the zone between the cap formation and the ore-body. On the west wall of the shaft, within this zone, there is a dark colored vein, 3 to 5 cm. wide, which can be followed for several meters. At first it runs almost horizontally to the south and disappears half-way up the shaft into the south wall. This vein consists of a crumbling, dark colored ore, which, according to an analysis of Prof. Schiffner, contains about 65 per cent copper pyrite and 35 per cent nickeliferous pyrrhotite. The residue, after treatment with aqua regia, consists of silicates from the diabase.

The descending water, dissolving the copper of the iron cap, precipitated it in a cleft which reached to the mass of sulphide ore. This observation of the precipitation of the dissolved copper, as copper sulphide, when it came in contact with the primary sulphides, agrees exactly with the discoveries of rich secondary copper sulphide as examined and explained by Messrs. C. R. Van Hise, W. H. Weed and S. F. Emmons.

The further examination of the ore showed that the diabase, rich in biotite, gave no uniform petrographic characteristics. It is partly rich, partly poor, in primary brown hornblende. The spinel modification only occupies a small space. The pieces taken from the stope lead the writer to believe that the rock only forms streaks or lumpy masses in the midst of the diabase or protobastite.

Dr. Dieseldorff, of Dresden, was kind enough to repeat the examination of the portions containing spinel, using the same method. He dissolved the powdered rock with hydrofluoric and sulphuric acids, the residue he again dissolved, with more concentrated acids, while at the same time he examined thin sections microscopically. Dr. Dieseldorff proved the presence of spinel, corundum and zircon in the rock composed of mica and plagioclase. He also proved the presence of topaz in the mass, a mineral which one would not expect to find here. The presence of topaz in small grains, was made certain by chemical and microscopic examination. By its insolubility in hydrofluoric acid, its high specific gravity, as well as its biaxial formation, as shown by the microscope, the writer also proved topaz to be present.

The nickel contents of the ore in the main mass average between 4 and 5 per cent, together with 2 per cent of copper. Towards the diabase it naturally becomes less. At the same time, it may be remarked that the Canadian ore of the same character only contained 2.67 per cent in 1895, and has since fallen, on further working, to 1.67 per cent.

* Translated and abstracted from *Zietschrift für praktishe Geologie*, November, 1902.

EXPORTS OF IRON ORE FROM HUNGARY.—A movement is on foot in Hungary to protest against the exportation of native iron ore. The Government is being asked to withdraw the favorable freight rates to exporters of iron ore, on the grounds that if the exportation continues on the present scale the deposits will soon be exhausted.

A STUDY IN THE ECONOMICAL ARRANGEMENT OF COMPRESSED AIR HAULAGE.

By Ernest Brackett.

Perhaps there is no method of coal mining in the United States so common as the pillar-and-stall method in its broad sense applied to coal veins of moderate thickness, lying in flat or slightly rising, or undulating beds. It is to such cases that this paper is particularly applicable. The direction of the entries depend upon the strike, cleat, pitch, etc., of the coal. Whether they are driven double, triple or multiple depends upon difficulty of ventilation. The size of the pillars and width of workings depend upon the nature of the roof, floor and coal, and the amount of pressure. The distance apart of two room, or across entries depends upon convenience or necessity in taking out the pillars or keeping up the workings, road maintainance, haulage and perhaps ventilation.

The limit of economical work assignable to one opening depends upon haulage, drainage, ventilation and local conditions. These and doubtless other considerations all have their weight in influencing the plan of working. But it is to the influence of haulage, on the economical working limit and on the cross and haulage entry distances in particular cases that this study now refers. As compressed air haulage is the most flexible of all mechanical systems its application is principally discussed.

Let it be assumed that a tract of land (Fig. 1) of indefinite extent eastward of the crop line A D is to be opened at some point in the crop, such as M. If the coal lay perfectly flat the workings can be extended north, east and south with equal economy for equal distances until the cost of haulage absorbs all the profit the market affords. The distance at which this would occur can be designated in feet by a.

If p^1 is the profit in dollars on a ton[1] of coal exclusive of all haulage and c the cost per foot-ton net in dollars, of the principal system of haulage used, then $a = \frac{p^1}{c}$. Supposing that all coal came from the face to the mouth of the mine by a straight line, then the theoretical form of the field profitably worked would be a semi-circle with M as a center. But to work a field in that shape would leave the remaining part in an awkward condition, for subsequent openings. To obviate this let it be assumed that the *form* of the field is that of the circumscribed rectangle A B C D. To compensate for hauling on the entries instead of by a straight line, and for changing the form of the field, p^1 can be decreased. This will give a sort of mean value for a.

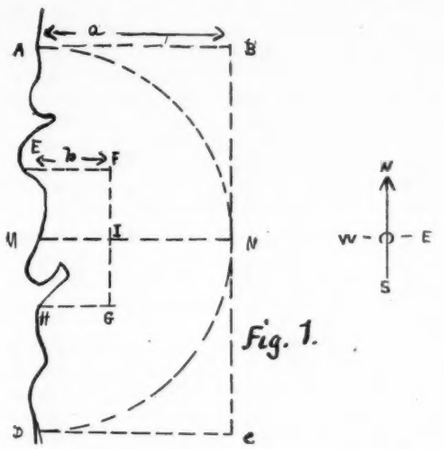


Fig. 1.

So far the limit of *profitable* work only has been discussed. But this is not the working limit which will give the *maximum profit per acre, plant included.*

Let p be the profit in dollars per square foot of

[1] Tons of 2,000 lbs. are used throughout.

coal exclusive of the cost of the principal haulage and the cost of the plant. Let T be the total cost of the plant in dollars. Let E F G H be any limit of working, similar in form to, and less than A B C D. Let A B in feet equal a. Let E F in feet equal b.

Now the profit on a square foot of coal at M is p, and at N is nothing. Therefore, we may consider the profit on a square foot at I as determined by the proportion $M N : I N = p : x$, where x is the unknown profit. Whence $x = \frac{I N \times P}{M N} = \frac{p\,(a-b)}{a}$. The total profit on the area E F G H is equal to the sum of the volumes; of a parallelopiped whose base is E F G H with an altitude of x, and a pyramid whose base is E F G H with an altitude of $(p - x)$; less the total cost of the plant T. Or,

$$P = \frac{2\,b^2\,p\,(a-b)}{a} + \frac{2b^2\left(p - \frac{p\,(a-b)}{a}\right)}{3} - T$$

which reduces to

$$P = 2\,b^2\,p\left(1 - \frac{2\,b}{3\,a}\right) - T$$

The mean profit on a square foot is

$$\frac{P}{2\,b^2} = p\left(1 - \frac{2\,b}{3\,a}\right) - \frac{T}{2\,b^2}$$

In order to find what value of b will give the maximum profit per square foot (and therefore per acre) the differential equation $\frac{d\left(\frac{P}{2\,b^2}\right)}{d\,b} = 0$ must be applied. This gives the result:

$$b = \sqrt[3]{\frac{3\,a\,T}{2\,p}}$$

If $T = \$50{,}000.00$, $p^1 = \$0.15$ and $c = \$0.000003$, which last is a figure for good mechanical haulage; then $a = \frac{.15}{.000003} = 50{,}000$ feet. $p = p^1 \times$ number of tons per square foot equal, say, $p^1 \times .2$ for a 6-foot vein of ordinary purity, or $p = 0.03$. By applying the above formula we find

$$b = \sqrt[3]{\frac{3 \times 50{,}000 \times 50{,}000}{2 \times .03}} = 5{,}000 \text{ feet.}$$

That is to say that, in this case, after the opening has worked an area measuring 5,000 ft. east and west, and 10,000 ft. north and south, it would pay to stop work and open again if it could be done with the same advantage as the first opening.

This result represents an ideal case calculated by an approximate method. The imaginary pyramid is not strictly true, and coal is not usually found in level beds. This problem indeed is subject to so many local conditions that further mathematical study of it would be unprofitable. Such being the case the influence of haulage on the underground arrangement of the same mine will be considered.

Let it be assumed that the direction of the main entry is to be M N, which is on the butts; that all butt or room entries are to be parallel, and that all haulage or face entries are to be perpendicular to it.

Let M (Fig. 2) represent the mine mouth, M N the main entry, and A B C D any rectangular block of coal whose dimensions are the distance between two butt entries $A D = r$, and between two face entries $A B = h$, leaving out of account barrier pillars and entry cores. Also assume its sides A B and D C parallel to M N. Draw M E perpendicular to M N through M. Let the distance in feet from the center of the rectangle A B C D to E M be represented by X. Let the distance from the same center to M N be represented by Y.

Let the distances in feet of the southwest corner of the rectangle from E M and M N be represented by x and y, respectively.

This rectangle can be worked in four ways, as follows:

CASE 1.—By driving a face entry along D A and a butt entry from D to C. Then working rooms northward only.

CASE 2.—By driving a face entry along D A and a butt entry from this face entry through the center F. Then working rooms north and south.

CASE 3.—By driving a face entry through the center F and a butt entry right and left along D C. Then working rooms north only.

CASE 4.—By driving a face entry through F and a butt entry right and left from F. Then working rooms north and south.

Let C_x be the cost in dollars per foot-ton net of hauling along the main butt entry. In the same way

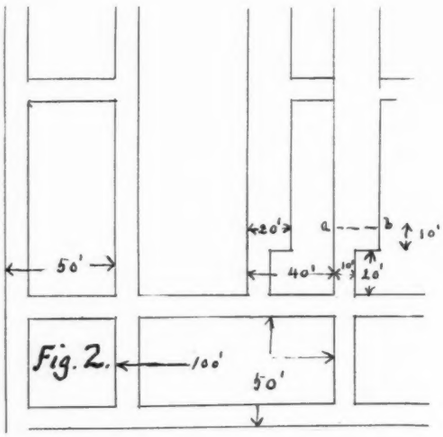


Fig. 2.

let C_y be the cost of hauling along any face entry. Let c be the cost of hauling along any butt entry, and let c^1 be the cost of hauling in the rooms.

The mean cost of hauling a ton of coal from the rectangle A B C D to M in case 1 is the cost of hauling a ton from F. This cost is:

$$\frac{N\,C}{2} + \frac{r\,c^1}{2} + x\,C_x + y\,C_y$$

But when A B C D is $\begin{Bmatrix}\text{North}\\ \text{South}\end{Bmatrix}$ of M N, $y = \begin{Bmatrix}Y - \frac{r}{2}\\ Y + \frac{r}{2}\end{Bmatrix}$

and $x = X - \frac{h}{2}$

By substitution and reduction, mean cost of haulage =

$$\frac{h\,(c - C_x)}{2} + \frac{r\,(c^1 \mp C_y)}{2} + X\,C_x + Y\,C_y.$$

Now X C_x, Y C_y, $(c - C_x)$, and $(c^1 \mp C_y)$ are all constants. Hence the cost of haulage depends upon h and r. But as the cost of entries also depends upon h and r the most economical values of those variables may be profitably studied. Let F be the cost in dollars of driving and equipping a face entry per foot. Let B be the cost of driving and equipping a butt entry per foot. Let f be the tons of coal yielded per square foot of area.

The cost of face entries per ton, neglecting barrier pillars, entry cores and so forth, then is $\frac{F\,r}{f\,h\,r} = \frac{F}{f\,h}$; and the butt entries is $\frac{B}{f\,r}$.

Adding the cost of entry driving to the cost of hauling per ton gives

$$C = \frac{h\,(c - C_x)}{2} + \frac{r\,(c^1 \mp C_y)}{2} + X\,C_x + Y\,C_y + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Where C is the mean cost in dollars of hauling and driving and equipping entries per ton.

In a somewhat similar way the remaining cases give the following solutions:

Case 2.

$$C = \frac{h\,(c - C_x)}{2} + \frac{r\,c^1}{4} + X\,C_x + Y\,C_y + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Case 3.

$$C = \frac{h\,c}{4} + \frac{r\,(c^1 \mp C_y)}{2} + X\,C_x + Y\,C_y + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Case 4.

$$C = \frac{h\,c}{4} + \frac{r\,c^1}{4} + X\,C_x + Y\,C_y + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Now in order to find what values of h and r in each case will give the least value of C all constant terms may be canceled. To compare each case with the rest all common terms may be canceled. Therefore, the constant common terms X C_x and Y C_y may be disregarded entirely.

By observing the above and applying the differential formula $\frac{d\,C_h}{d\,h} = 0$ and $\frac{d\,C_r}{d\,r} = 0$ to find values of h and r giving the minimum value of C the following equations are obtained.

Case 1.

$$h = \sqrt{\frac{2\,F}{f\,(c - C_x)}}$$

$$r = \sqrt{\frac{2\,B}{f\,(c^1 \mp C_y)}}$$

$$C = \frac{h\,(c - C_x)}{2} + \frac{r\,(c^1 \mp C_y)}{2} + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Case 2.

$$h = \sqrt{\frac{2\,F}{f\,(c - C_x)}}$$

$$r = \sqrt{\frac{4\,B}{f\,c^1}}$$

$$C = \frac{h\,(c - C_x)}{2} + \frac{r\,c^1}{4} + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Case 3.

$$h = \sqrt{\frac{4\,F}{f\,c}}$$

$$r = \sqrt{\frac{2\,B}{f\,(c^1 \mp C_y)}}$$

$$C = \frac{h\,c}{4} + \frac{r\,(c^1 \mp C_y)}{2} + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Case 4.

$$h = \sqrt{\frac{4\,F}{f\,c}}$$

$$r = \sqrt{\frac{4\,B}{f\,c^1}}$$

$$c = \frac{h\,c}{4} + \frac{r\,c^1}{4} + \frac{F}{f\,h} + \frac{B}{f\,r}$$

Let it be assumed that the height of the coal is 6 ft., averaging $f = 0.2$ tons run of mine per square foot; that the grades are all light, suitable for compressed air locomotive haulage on all the workings.

Assuming that the locomotive haulage is in every case carried on the main entry and along the face entry. Three plans may be considered as follows:

Plan 1.—Horses work on the butt entries and deliver cars to the face of the rooms.

Plan 2.—Locomotives work on the butt entries and deliver cars to the face of the rooms.

Plan 3.—Locomotives work on the butt entries and deliver cars to the room necks. Miners take cars to the face of the rooms.

Assume that a locomotive weighing from 5 to 9 tons is used, and is capable of hauling 16 cars holding two tons net run of mine each. The average cost per day per locomotive, of several plants containing locomotives of similar size, including interest and depreciation, at about 10 per cent on plant, boilers and pipe line, and labor at about $1.60 is:

For a two locomotive plant in operation	$8.60
For a two locomotive plant in operation	9.59
For an ideal one locomotive plant based on a two locomotive plant in operation	12.18
Averaging	$10.12

In this problem, however, the pipe line properly belongs to the cost of equipping entries. Moreover, it is probable that several locomotives will be required. Therefore the following daily cost is adopted, which is an average per locomotive from an imaginary plant containing 12 locomotives of two sizes.

1 engineer	$2.10
1 tripman	2.00
Labor at plant including fireman	.34
Oil for locomotive and plant	.18
Coal for plant @ 60c. per ton	.75
Depreciation (5%) and interest (6%) on locomotive and plant including boilers at 11% per year (of 200 working days)	2.84
Total	$8.21

The speed of several locomotives in operation on entry work, including stops, in feet per minute is 291, 370, 171, 200; averaging 258 ft. per minute, or 15,480 ft. per hour. The average speed of tail ropes runs from 17,000 to 25,000 ft. per hour on hauls of from 3,000 to 5,000 ft. one way, stops included.

It would seem from the above that 18,000 ft. per hour would be a safe figure on which to base the present calculations.

The cost per foot-ton net of haulage can now be figured as follows:

If the day is 9 hours long a locomotive will travel $9 \times 18{,}000 = 162{,}000$ ft. per day at a cost of $\frac{8.21}{162{,}000}$ per foot. But two feet must be traveled for each net load hauled one foot. Each net load is $16 \times 2 = 32$ tons. Hence the cost of haulage per foot-ton net is

$$\frac{8.21 \times 2}{162{,}000 \times 32} = \$0.00000317$$

But if the locomotive worked in the rooms only 2 tons would compose the net load.* Moreover, additional delay would be incurred in the work in the rooms, due to switching and bad track. This we can consider as cutting down the daily travel to only 108,000 feet per day. Under these conditions the cost of haulage would be

$$\frac{8.21 \times 2}{108{,}000 \times 2} = \$0.00007602$$

The cost of one horse and driver per day is: Driver, $2.10; keep of horse, 50c.; interest and depreciation on horse at 20 per cent per year (of 200 working days), 10c.; interest and depreciation on stable, per horse, at 10 per cent per year, 5c.; total, $2.75.

The hourly travel of a horse in several cases is as follows: Entry and room work, 4,741 ft.; 3,825, 3,595, 4,594, 4,082, 5,521, 6,625; entry, work only, 6,745 ft.; averaging, 4,966 ft.

The first five figures are for grades from, say, 2 to 5 per cent, and 2.5-ton net cars. The last three figures are for grades below 2 per cent and for 2-ton net cars. As light grades and small cars have been assumed the hourly travel of a horse is taken at 5,500 ft. per hour, or 49,500 ft. per day in both rooms and entries. It is presumed that the advantage in speed of work on entries over rooms is not very great.

Considering a horse hauls two cars on the entry and one in the rooms the cost of the entry haulage is:

$$\frac{2.75 \times 2}{49{,}500 \times 2 \times 2} = \$0.00002778$$

and in rooms is:

$$\frac{2.75 \times 2}{49{,}500 \times 2} = \$0.00005555$$

If spike teams of two horses each hauling four cars and traveling 6,000 feet per hour were used on the entries the cost of haulage over that part of the entries on which they were used would be:

$$\frac{3.40 \times 2}{54{,}000 \times 4 \times 2} = \$0.00001574$$

or only a little more than one-half of the previous figure. This method of entry haulage is mentioned here for completeness only. Hereafter where horses are used on the butt entries they are assumed to be driven singly, hauling two cars each.

Thus far we have assumed that the horse or locomotive goes up a room and back again to obtain one car. It matters little to the calculations whether this trip be made to obtain a load or deliver an empty. If the room has a single track it evidently must be one or the other. This leaves the balance of the work to be performed by the miners. If the room is steep enough to run the loads out his contract is assumed to include that part of the work. If not, he is assumed to take the empties in.

Now the cost of a laborer per day is less than the cost of a horse and driver, and he can travel about as far. Hence, if the delivery of cars to the face of the rooms were within his capacity one would naturally look to him for a more economical solution of the problem. But since the miner must make a trip down and up his own room whether he handles his empty or load it seems natural that he should handle both. In several of our coal fields the rooms have been shortened and this method is now adopted. Although the miner receives no extra pay his work is not without some recompense as he receives a more prompt delivery of his empty, since he does not have to wait for the horse or locomotive to make trips in adjacent rooms.

Now one man can with some exertion give a tractive effort of 125 lbs. But for his convenience it is assumed that he can exert but 50 lbs. As there are usually two miners in one room, a tractive effort of 100 lbs. is available. A two-ton car will weigh empty about 1,500 lbs., and loaded about 5,500 lbs. The coefficient of friction on a wooden rail is 4.3 per cent. As 100 is 6⅔ per cent of 1,500, two men can push an empty up a grade of $(6\frac{2}{3} - 4.3) = 2.4$ per cent. Again, as 100 is 1.9 per cent of 5,500, two men can push a load down a grade of $(4.3 - 1.9) = 2.4$ per cent.

To permit men delivering their own cars to the face and their loads to the entry, it is, therefore, advisable that the grade be 2.4 per cent to the rise. In general, as rooms must go to the rise it will be possible to work rooms on one side of the butt entry only. In Plan 3 it is assumed that the rooms are made 250 ft. long, and the miners move their own cars in the rooms.

With these explanations the values of the haulage constants may be tabulated as follows:

	Cx.	Cy.	c.	c^1.
Plan 1 ...	$0.00000317	$0.00000317	$0.00002778	$0.00005555
Plan 2 ...	0.00000317	0.00000317	0.00000317	0.00007602
Plan 3 ...	0.00000317	0.00000317	0.00000317	0.00000000

The cost of an entry may be considered under two heads: First, the cost of narrow work; second, the cost of fixtures, such as track.

Narrow work is of three kinds, namely, entry work, break throughs and room necks. Let it be assumed that double entries are driven 10 ft. wide, at 50 ft. centers, with break throughs every 100 ft.; that rooms are 20 ft. wide at 40 ft. centers having a 20-ft. "jaw" next to the entry, as shown in Fig. 3.

The coal in one foot of entry is $10 \times 0.2 = 2$ tons. The coal in an entry breakthrough is $10 \times 40 \times 0.2 = 80$ tons, which is 0.8 ton per lineal foot of entry. The narrow coal in a room neck is all the coal between the line ab (Fig. 3), and the entry rib; which is $2 \times 10 \times 20 \times 0.2 = 80$ tons, which is two tons per foot of entry.

Assuming that the differential in the mining rate between wide and narrow work is 10 cents per ton the cost of driving a double face entry is:

4 tons for two entries.
0.8 tons for break-throughs.

4.8 tons at 10c. = 48c. per foot.

The cost of driving a double butt entry with rooms on one side only is:

4.8 tons for two entries and break-throughs.
2.0 tons for room necks.

6.8 tons at 10c. = 68c. per foot.

The cost of driving a double butt entry with rooms both sides is similarly found to be 88 cents per foot.

The fixtures of an entry are, track, room partings, pipe lines, electric lines, etc. Here the cost of track, room partings and pipe lines only will be considered.

The rail of a mine track is usually used more than once, therefore only a depreciation should be allowed on it in figuring the cost. The depreciation must evidently be governed by the number of times it is used. The cost then of several of different kinds of track are figured as follows:

Wooden Track per yard.

6 feet of 4x4 in. rail at $14 per M. B. M. at ¾ depreciation	$0.084
2 ties at 7½c. at ¾ depreciation	.112
Labor	.120
Hauling materials and other expenses	.013
Cost per yard	.329
Cost per foot	0.110

Iron Track (20-pound) per yard.

2 yds. 20-pound rail at 1.5c. ⅓ depreciation	$0.200
2 ties at 15c.	.300
Spikes	.051
Plates at ⅓ depreciation	.044
Bolts	.005
Labor	.135
Hauling material and other expenses	.016
Cost per yard	.752
Cost per foot	.251

In the same way the cost of 30-lb. iron track per foot is $0.284, and of 40-lb. iron track is $0.317 per foot.

Now a room parting can be laid with about 30 ft. of 20-lb. track. But if the entry had not been driven it would be necessary to lay wooden room track across the space now occupied by the double entry and the room neck. In other words, the space now

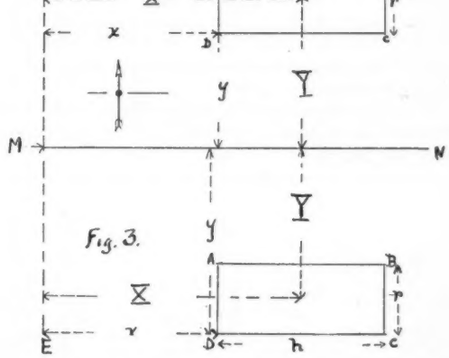


Fig. 3.

occupied by the entry would have been occupied by rooms. Hence the net cost of the room turn is the difference between its actual cost and the cost of the wooden track displaced, thus:

Where Rooms are Driven one Way Only.

Cost of 30 ft. of 20-lb. track at $.251	$7.53
Cost of 1 frog at $1.50 ⅓ depreciation	.50
Total	$8.03
Less 20 ft. of wooden track at $0.110	2.20
Net cost of room-turn	$5.83
Cost of room-turn per foot of entry	$0.146

In the above case if 30-lb. iron were used instead of 20-lb. iron we would have obtained $0.170 as the cost of room turns per foot of entry If 20-lb. iron were used and the rooms driven both ways, then the following figures would apply:

Cost of 60 ft. of 20-lb track at $.251	$15.06
Cost of 2 frogs at $1.50 ⅓ depreciation	1.00
Total	$16.06
Less 80 ft. of wooden track at $.110	8.80
Net cost	$7.26
Cost of room-turns per foot of entry	$.182

If 30-lb. iron had been used the last result would have been $0.230.

Twenty feet are deducted in the first instance as the rooms from the next entry outside are supposed to take the entry core. This might be the case in some methods of retreating. In the second instance the rooms could not take the entry core, thus $20 + 10 + 40 + 10 + 20 = 100$ ft. of wooden track would be avoided. But as some wooden tracks will probably be used to take out the core only 80 ft. are deducted.

Let it be assumed that a 6-in. compressed air main laid only on the main entry M N (Fig. 2) and a 2½-in. branch line laid along each face entry are sufficient to supply the locomotives. The cost of the large line in place will be:

Material per foot (including charging stations)	$1.121
Labor per foot	0.100
Total per foot	1.221

* In some regions more than one car is delivered per room at once.

Now only a small part of this dependent upon the number of butt entries worked can be charged to them. The number of butt entries in a given tract of land depends upon the unknown quantity r in this problem. But as an approximation, suppose there are 15 butt entries. The cost of the main air line per foot of butt entry will then be $\frac{1.221}{15} = \$0.081$. The 2½-in. branch lines will be used, say, four times as they are transferred from face entry to face entry as the work progresses. The cost of branch line per foot of face entry will then be figured as follows:

Material per foot (including charging stations)	$0.393
Labor per foot	0.030
Total cost of one foot of branch line.....	$0.423
Cost of branch line per foot of face entry*.....	0.106

Now for horse haulage the track and room turns on butt entries can be of 20-lb. iron and the track on face entries can be of 30-lb. iron. For locomotive haulage it will probably be necessary to use 30 and 40-lb. iron for these purposes. Horse or locomotive haulage refers strictly to butt entries. If locomotives are used on face entries only, the lesser amount of work required of them is supposed to permit a lighter rail on the face entry.

A double face entry or a double butt entry with rooms on one side only will require a track in one of the entries only. If the rooms are driven both ways a track in each butt entry will be required. This omits, of course, the wooden track required to drive the entries.

With the above remarks the following table has been prepared showing the total cost of double entries per foot:

	Horse Entries.			Locomotive Entries.		
Per lineal foot.	Face E.	Butt E. Rooms one way.	Butt E. Rooms both ways.	Face E.	Butt E. Rooms one way.	Butt E. Rooms both ways.
Cost of narrow wk	$0.480	$0.680	$0.880	$0.480	$0.680	$0.880
Cost of track.....	0.284	0.251	0.502	0.317	.284	.568
Cost of room-turns	....	0.146	0.182	....	0.170	.230
Cost of pipe line .	....	....	....	.106	.081	.081
Totals	$0.764	$1.077	$1.564	$0.903	$1.215	$1.759

By substitution in the previous formulas the following results are obtained:

In case 1, plan 1, on the north side of MN,

$$h = \sqrt{\frac{2 \times .764}{.2\,(.00002778 - .00000317)}} = 557$$

$$r = \sqrt{\frac{2 \times 1.077}{.2\,(.00005555 - .00000317)}} = 453$$

$$C = \frac{557\,(.00002461)}{2} + \frac{453\,(.00005238)}{2} + \frac{.764}{.2 \times 557} + \frac{1.077}{.2 \times 453}$$

Whence $C = .019 + .007 + .012 = .038$

In a similar way the values for all the previously mentioned cases and plans have been worked out and listed in the following table.

The part of the solution relating to haulage being the sum of the first two terms of the equation for C is listed in column 3. If H is the mean cost of hauling a ton from the rectangle A B C D, Fig. 2, to the mouth of the mine less $(X\,C_x + Y\,C_y)$.

The second and third terms are the mean costs per ton of driving face and butt entries.

The results are shown in columns 4 and 5. The 6th column shows the totals which by comparison show the relative merits of each case and plan. The table refers to the north side of the mine only.

It is somewhat surprising to note a difference of only 1.1 cents per ton between the most and least economical methods.

Gathering cars from the room necks with locomotives, working rooms and entries one way only, is the most economical, provided of course that the grade of the rooms permit men to handle their cars. Driving the entries both ways with the same plan comes indeed very close to it in economy, but possesses little if any advantage in other ways and may be disregarded altogether.

Case.	Plan.	(1.) h.	(2.) r.	(3.) haulage.	(4) faces.	(5.) butts.	(6.) totals.
		feet	feet				
1	1	557	453	$0.019	$0.007	$0.012	$0.038
2	1	557	750	.017	.007	.010	.034
3	1	742	453	.017	.005	.012	.034
4	1	742	750	.016	.005	.010	.031
1	2	*(1500)	408	.015	.003	.015	.033
2	2	*(1500)	680	.013	.003	.013	.029
3	2	2387	408	.017	.002	.015	.034
4	2	2387	680	.015	.002	.013	.030
1	3	*(1500)	*(250)	.000	.003	.024	.027
3	3	2387	*(250)	.002	.002	.024	.028

*Formula fails to give results. Value in parentheses assumed.

Next to this if the rooms were level or gently undulating, so that they could be worked each way, gathering by horses or locomotives in the rooms would be the most economical. If horses were used the entries would be driven both ways, if locomotives only one way. It will be noticed that the figures show a difference of only two mills between horses and locomotives in favor of the locomotives. Now if the grade on the entry is such as to require large locomotives it would probably be necessary to lay iron track in the rooms in place of wooden ones, if the locomotive went inside. This extra cost of track might very easily amount to from ½ to 1½ cents per ton which would evidently make horses more economical. But if the grade on the entry was gently in favor of the loads, a light locomotive might be used which could run up the rooms on a wooden track. This locomotive would possess the additional advantage over a large one, of being cheaper. Under these conditions it would seem that one might find an economical solution to the problem by its employment.

The advantage in haulage and entries in working both ways over working rooms one way is seen by inspection of the table to be from 3 to 4 mills per ton. But driving rooms one way possess four advantages over driving both ways. Each or all of these may make it more economical to work one way only.

First.—Whether ventilation be carried on by coursing the air, with a trap door on the face entry, between the two butt entries of a pair, or by splitting the air with one or more outthrows at the intersection of the butt and face entries, one more trapper will be needed when rooms are going both ways than would be required if rooms went one way only. This extra one will usually be placed either at some breakthrough between the two butt entries, or between the two face entries, on one of the butt entries of a pair. His wages might easily amount to 5 mills per ton.

Second.—If the mine is inclined to be gaseous it will probably be advisable to leave a barrier pillar between each pair of entries, to prevent interference in ventilation of one pair with the adjacent pairs. If rooms are driven both ways the only place this pillar can be left is between the faces of the two sets of rooms advancing in opposite directions. But this leaves such a pillar in an almost inaccessible position for future removal. If rooms were driven one way only the barrier could be left between the faces of the rooms from one entry and the next pair of entries. This places it in the best possible position for a subsequent removal.

Third.—The pitch of the coal may be such as to cause an accumulation of water at the faces of the rooms which go even a little to the dip. If the miners have to bail this water the cost of the coal may very easily be increased 2 or 3 cents per ton in some rooms.

Fourth.—The pitch of the coal may increase the cost of haulage, or even make haulage impractical, in the dip rooms.

But where the coal is hard, roof and floor good, and pressure light the great output possible from a pair of butt entries very much decreases the cost of extra trapping per ton. Where mines are easily ventilated the necessity of barrier pillars is avoided, and when the coal is level or gently undulating the disadvantages of drainage and haulage becomes a minimum. Under these conditions working rooms both ways might be found economical.

If it prove more economical to work rooms one way only, and the delivery of cars to the face by the miners is impracticable, one must solve the problem either by working locomotives in the rooms, entries going one way only or by working horses in the rooms, entries going both ways.

Thus far it has been assumed that the butt entry haulage when horses were used was done by them working singly, each horse hauling two cars at a time. But suppose he could haul more cars or that string teams were used from a gathering switch outside the last working room on a butt entry to the face entry, or even suppose that locomotives hauled continuously to this gathering switch, then our formulae would show an increased value for h and an increased efficiency for working horses in the rooms. It would undoubtedly be found that the very slight advantage of locomotives in the rooms over horses had completely disappeared. This leaves the room work entirely to either horses or men. Indeed one might have expected this result as the values of c^1 show that locomotives work at great disadvantage in rooms where only one car is delivered. We are, of course, not considering special cases where it is simply a question of working a locomotive in the rooms or permitting it to be idle.

Having now discussed the arrangement of haulage from its intrinsic economy some mention might be made of its relation to methods of work and output.

If the coal is hard, the roof and floor good, the pressure light and ventilation easy, a method of advancing can be adopted. If the coal be worked advancing by driving the butt entries one way only (east in this problem), and by driving rooms both ways, the greatest possible output can be obtained in the least possible time, and with the least preliminary development. This is because no entry is ever stopped or no room delayed, when it could have been driven or opened, unless indeed it is stopped to prevent further increase of output. Furthermore the output with this methods is independent of the butt entry distance r. This is because the number of rooms on a butt entry become constant as soon as the first one works out. Now the constant number increases in exactly the same proportions as r increases. But the number of butt entries varies inversely as r. Hence the above conclusion. The output is evidently independent of h. As the value of any kind of mechanical haulage increases as the work becomes more concentrated, it would seem that working advancing offers the best opportunity

However, coal is often tender, roof and floor bad, pressure great, and ventilation more or less difficult. Each or any of these might make working retreating far more economical than advancing. This makes it necessary to do more preparatory entry driving, makes the output at the end of a certain time somewhat dependent upon h and r, and makes the number of rooms on an entry less. This last especially decreases the efficiency of locomotive haulage, because smaller units will likely be used, to collect the output of an entry, and therefore more locomotives and more men must be employed for a given output.

Finally, it is not intended that this article should be construed to show how little is the advantage of locomotives over horses. It shows how locomotives and horses may be best arranged to accomplish their work economically and incidentally, how little is the advantage of locomotive on room work.

Where the amount of work accumulated is at all adequate to the increased power and speed of any system of mechanical haulage, its economical advantage is enormous. But the best system must fail if the work done is so scattered that a very large amount of time must be spent working on only a small fraction of capacity.

* Strictly speaking the cost of branch line per foot of face entry should be

$$\frac{.393}{4} + .030 = \$.128$$

NOTES ON COMMERCIAL CYANIDE OF POTASSIUM*

By A. WHITBY.

The enormous increase in the consumption of cyanide in the gold industry has raised the commercial importance of this chemical and has led to the introduction of new processes in its manufacture. It is the purpose of this contribution to show how wide the difference may be in its composition while still retaining an advertised percentage, say, of 98 per cent.

While a great number of impurities may be present it is only intended to discuss a simple determination of the ratios of potassium, sodium, cyanogen and carbonates. In all five samples were examined emanating from four distinct sources.

The method adopted was to dissolve 10 grms. in 500 c.c., using this solution for all subsequent tests. The determination of carbonate and cyanogen should be made on the freshly prepared solution. For carbonates 50 to 100 c.c. were taken, treated with two or three drops of ammonia and a 10 per cent solution of calcium nitrate added in slight excess, filtered rapidly and washed with hot water containing a little ammonia. The precipitate was ignited to oxide, weighed and calculated to carbonic acid.

The cyanide was determined in the usual way, but in the case of No. 3 it was found necessary to remove the sulphides by shaking with precipitated carbonate of lead and filtering before titrating with nitrate of silver.

For the determination of alkalies 50 c.c. were evaporated with a slight excess of hydrochloric acid, taken up again with a few c.c. of concentrated acid and again evaporated. With the exception of No. 1 a pure white residue was obtained in all cases. For more accurate work it would be necessary to remove heavy bases by dissolving the residue in water rendering slightly alkaline with ammonia and passing sulphuretted hydrogen to remove the traces of lead and iron present. Should calcium be present this treatment must be supplemented by the addition of a few drops of ammonium oxalate, the solution rendered acid with hydrochloric and again evaporated to dryness, gently ignited and weighed. For the purpose of these experiments, however, it was found sufficient to merely evaporate to dryness with acid, as even the most impure sample gave mere traces of insoluble residue, and the qualitative examination showed little lead or iron and no lime. The total chloride was then estimated with decinormal silver nitrate and the ratio of potassium to sodium determined by the indirect method. The following table gives the results obtained:

	1.	2.	3.	4.	5.
Potassium	6.5	30.5	30.8	45.6	—
Sodium	41.0	23.9	22.1	11.4	47.5
Cyanogen	39.4	38.8	37.6	40.4	51.2
Carbonate (CO_3)	7.5	3.0	4.7	0.3	trace
Undetermined	5.6	3.8	4.8	2.3	1.3
KCy & NaCy =	78.0	85.6	83.5	94.8	98.7

No. 1 was in small rounded lumps and powder, very dirty-looking and entirely different in appearance to any of the others.

No. 2. Usual irregular masses, white with slight greenish blue.

No. 3. Similar, but pure white. Guaranteed 102 per cent, but the sample had been exposed.

No. 4. Coarse powder, pure white. This is a sample of supposed chemically pure cyanide of potassium, and although bought at a very high price, contains 11 per cent of sodium and the impurities common to commercial cyanide.

No. 5 is a commercial cyanide of sodium. Guaranteed 125 per cent KCy in pure white crystalline masses.

Let us glance just for a moment at these figures. You will observe that No. 1 has more than sufficient sodium alone to combine with the cyanogen present and even by uniting the bases in the most favorable manner, there can only be 78.0 per cent of active cyanides, leaving 22.0 per cent of impurities. Nos. 2 and 3 are very similar, but it may be mentioned with regard to No. 3 that it is heavily charged with sulphides, and although coming from the same source as No. 5, is eminently typical of what the manufacturer can do in the way of nice adjustment. It is difficult to express any opinion about No. 4, except that apparently some attempt has been made to turn out a pure chemical of guaranteed 100 per cent KCy, but a very poor one, in view of the price paid. No. 5, on the other hand, is a sample of a commercial cyanide of sodium showing what the manufacturer can do if he tries.

The sole object of these experiments was to show how the present system of purchasing cyanide left the manufacturers a very wide margin for impurities. Take No. 1, for example, containing about 13 per cent sodium carbonate and 5 per cent other undetermined impurities. It is doubtful even whether we must consider the potassium to be an impurity or not. It is extremely easy for the manufacturer to comply with existing conditions, and yet supply the consumer with a lot of things he can do without, and No. 5 shows what a commercial cyanide of soda should be.

Now, with regard to the importance of these unnecessary impurities. Alkaline carbonates take precedence over any others as tending to increase the alkalinity of solutions; then come cyanates as being eventually resolved into carbonates, and of least importance is the presence of sulphides. It is hard to understand why so much discredit has been attached to alkaline sulphide in cyanide. Take No. 3, for example. This is a cyanide so heavily charged with sulphides as to give quite a considerable precipitate with alkaline lead tartrate solution, and yet has been extensively used without complaint as to its effectiveness. Laboratory experiments with fresh solutions might show that sulphides are injurious, but not in working solutions containing zinc, which precipitates them as zinc sulphide.

To summarize: We have been using a mixture of sodium and potassium cyanide nicely adjusted to 98 per cent KCy, leaving room for extensive adulteration. The effectiveness of the mixed cyanides being accepted, it would appear desirable to adopt the use of a sodium cyanide, dropping the fiction of calling it potassium cyanide and demanding an efficiency of at least 50 per cent cyanogen. Or if potassium cyanide is to be used some limit should be given for sodium cyanide, merely to control the amount of inactive bodies.

* Abstract of paper read before the Chemical and Metallurgical Society of South Africa, Dec. 20, 1902.

IRON PRODUCTION IN SWEDEN IN 1902.

We are indebted to Dr. Richard Akerman for a preliminary statement of the production of iron in Sweden in 1902. His report shows that the total output of pig iron for the year was 524,400 metric tons. All of this iron was made with charcoal as fuel. The quantity of blooms produced from pig iron in charcoal hearths was 183,600 tons. The steel production for the year was 283,500 tons of ingots, of which 198,300 tons were made in open hearth furnaces, while 85,200 tons were bessemer or converter steel.

The exports of iron and steel for the year included 73,296 tons of pig iron, 20,380 tons of charcoal blooms, 8,148 tons of steel ingots and 174,013 tons of bar iron and steel. The exports of iron ore in 1902 reached a total of 1,719,293 metric tons.

GERMAN IRON PRODUCTION.

The production of pig iron in Germany for the full year ending December 31 is reported by the German Iron and Steel Union as below, in metric tons:

	—1901.—		—1902.—	
	Tons.	%	Tons.	%
Foundry iron	1,512,107	19.4	1,619,275	19.3
Forge iron	1,356,794	17.4	1,206,550	14.3
Bessemer pig	464,036	6.0	387,334	4.6
Thomas (basic) pig	4,452,950	57.2	5,189,501	61.8
Totals	7,785,887	100.0	8,402,660	100.0

The totals do not include the production of charcoal iron and of iron cinder, which amounted in 1901 to 94,201 tons in all.

The total increase last year over 1901 was 616,773 tons, or 7.9 per cent. The production for 1902 was the largest ever reported in one year, except that for 1900, which was 8,422,842 tons. The gain last year over 1901 was in basic pig and in foundry iron; forge iron and bessemer pig showed decreases.

Imports of pig iron into Germany in 1902 were light, amounting to 143,040 tons, against 267,503 tons in 1901; a decrease of 124,463 tons, or 46.4 per cent. The exports, on the other hand, showed a large increase, the total last year being 347,256 tons, against 150,448 tons in 1901; an increase of 196,808 tons, or 130.8 per cent. Most of this increase was due to a demand from the United States. Iron and steel products of all kinds, outside of pig iron, showed a large increase also, the total exports in 1902 being 2,961,764 tons, against 2,196,794 tons in 1901; an increase of 764,970 tons, or 34.8 per cent.

The imports and exports of iron ore for the year were as follows, in metric tons:

	1901.	1902.	Changes.
Imports	4,370,022	3,957,403	D. 412,619
Exports	2,389,870	2,868,068	I. 478,198
Net imports	1,980,152	1,089,335	D. 890,817

The imports were chiefly from Spain and Sweden. The exports were chiefly minette ores from Luxemburg, which went to France.

COST OF SHAFT SINKING BY HAND.

Mr. Edward H. Benjamin contributes to the *Pacific Coast Miner* an interesting statement regarding the cost of shaft sinking by hand in California. The table below gives the record of work in the last 150 ft. of the vertical shaft at the Golden Eagle Mine, Lassen County, Cal.—the property of the Lassen Mining Company.

	Shifts.	Wages or price.	Totals.	Cost per ft.
Miners (9)	423	$3.00 p'r s'ft	$1,269.00	$8,460
Topmen (2)	94	2.50 p'r s'ft	235.00	1.566
Engineers (2)	94	3.00 p'r s'ft	282.00	1.880
Blacksmith (1)	47	3.50 p'r s'ft	164.50	1.096
Foreman (1)	47	$100 p'r mo.	172,30	1.149
Total labor	705		$2,122.80	$14.151
	Quantity.			
Timber	10,976 ft.	$13 per M.	142.69	$0.951
Lagging	2,520 ft.	35c. a piece	88.20	0.588
Lining boards	2,270 ft.	$14 per M.	31.78	0.212
Cordwood (blocking)	5 cords	$3 per cord	15.00	0.100
Wedges	3,000	1c. a piece	30.00	0.200
Total timber			307.67	2.051
Wood (fuel)	25 cords.	$3 per cord	$75.00	$0.500
Oil and incidentals			15.00	0.100
Total power cost			$90.00	$0.600
Coal oil	6 cases	$4.15 case	$24.90	$0.166
Candles	6 cases	$6.40 case	38.40	0.256
Total illumination			$63.30	$0.422
Powder	600 lbs.	14c. per lb.	$84.00	$0.560
Fuse	2,500 ft.	$3.70 per M.	9.25	0.061
Caps	550	$6.25 per M.	3.44	0.023
Total explosives			$96.69	$0.644
Total cost of 150 feet of shaft			$2,680.46	$17.868

Mr. Benjamin adds the following details: "Work was commenced at a point 7 ft. below the 400 level and the shaft was sunk 150 ft. below that point. The work was done by hand drilling, working three eight-hour shifts, with three men on a shift. The ground was taken out 7 by 12 ft. in the clear—for a double-compartment shaft. Hoisting was done with a bucket. The country rock was hard andesite. No water was encountered. The shaft was timbered with 10 by 10-in. sawed timbers, end-plates and center-braces dovetailed in, and center and corner posts gained in. The sets were placed 5 ft. between centers, filled and lagged solid behind timbers and each compartment was lined with 1 by 12-in. lining boards set 3 ins. apart. The work was completed in 47 shifts, making an average of 3.2 ft. per shift, hoisting 20 tons of material per shift, besides putting in timbers. The timbers were framed by hand by the foreman, who directed the work. Eighteen holes were drilled for each round. No. 2 Giant powder was used. The ground drilled hard, but broke well. The outside holes were kept high and the center broke first. I do not know of any work done by hand where a better record has been made."

THE VEINS OF BOULDER COUNTY, COLORADO.*

By RUFUS M. BAGG, JR.

No subject presents so many difficult problems as a study of the origin of vein materials. Massive rocks, especially of the plutonic type, like granite, gneiss, etc., are more or less cut by veins, dikes and intercalated eruptives of varying composition. These veins do not always carry ores of the same metal, and often we find examples, as in Boulder County, of two veins near each other, which produce different minerals, although occurring in the same kind of rock magma. An illustration of this is found in the Yellow Pine Mine adjoining the Logan. In the Logan Mine the veins are narrow, but exceedingly rich in both free gold and the tellurides of gold, while the ores from the Yellow Pine are worked for silver alone.

A little to the northwest of these mines a number of good-looking quartz veins with well-defined walls occur, nearly all parallel, having a north and south trend, and while one of these may be found rich enough to work the others are practically barren. We may well question in such a case: Why is this so? If the ore in the vein has been deposited by lateral secretion from the country rock, why is the mineral not present in varying amounts in all the veins in the immediate neighborhood? Is it possible that these several veins were formed at different times and impregnated at successive periods? In answering this question we should note that the principal gangue is always quartz, and since the veins have the same parallel arrangement it looks as though they must have been formed at about the same time and have been filled in the same manner. Since the country rock is but little changed, in places not at all, and since the walls are well defined it seems to the writer that these veins have been filled by thermal solutions from below, and that the mineralization has gone on concurrently with the deposition of the quartz. The presence of tellurides further suggests infiltration from below, so does the fact that the ores usually occur in lenticular masses and are confined to definite horizons along the course of the vein. Where these lodes are cut by cross-veins, ore is almost certain to occur, and it is always richer at and around the junction than any portion of the separate vein. At some mines, such as the Emancipation, Gardner, Slide, etc., gold occurs native in association with tellurium compounds, chiefly sylvanite; while in other mines, like the Tambourine, the ores are nearly all sylvanite, calaverite, and pyrite finely disseminated throughout the entire mass of the lode. These veins differ in amount of dip, width, persistency of direction, width of ore-shoots, richness, and in their relations to the country rock, but since they occur in parallel arrangement, contain the same filling and are characterized by the same ores, I believe that they were all formed in a similar way, the major part of the ore being deposited by infiltration from below.

There is, however, another class of ore-deposits in this immediate region, which I think suggests a different explanation. I refer to the conditions in the Logan Mine, near Crisman. In this case two distinct veins, the Logan and the Teller, have been developed. The former runs northeast and southwest, with a sharp dip of 60° west. This vein apparently originated from a fracture which took place along the most easterly side of an anticlinal fold, the fracture being followed by a displacement of the walls which were so irregular that cavities of considerable size and number were developed along its course to a great depth. These cavities were then filled by solutions, which presumably came from the country rock (which is somewhat altered), and also from below, as in the veins previously mentioned. This Logan vein has been proved productive to a vertical depth of 900 ft., and the lowest levels are still in ore. The ore is in small lenses, which are mineralized, sometimes on the foot wall, sometimes on the hanging wall and sometimes uniformly through the entire mass. The richest part of the vein, however, is near the center, where the free gold occurs in rounded grains literally filling the entire mass, but the quartz is colored dark by finely divided marcasite and roscoelite. The last mentioned mineral is said to occur always in the very richest parts of the vein. These lenses of ore lie like the scales of a fish, overlapping each other; before one dies out another begins.

The Teller vein makes an angle with the Logan and has quite an east and west trend until it finally joins the Logan vein. In depth also they are approaching; it is likely that they unite at no great distance below the present workings. There is more silver in this Teller vein than in the Logan, but it is also occasionally very rich in free gold. On the lower levels a little sphalerite occurs sporadically.

Another fact which points to lateral secretion is found in the greater richness of the veins near the surface, where percolating waters would naturally have the best chance to penetrate the granites. I found one place on the Logan vein within 80 ft. of the surface, which was then yielding ore of a value of $50 per lb., although, of course, there was not a great deal of this kind of stuff, and the whole vein was very narrow. The width of the vein matter is quite variable, being in some places less than 5 ins., and increasing to 1 or 2 ft. within a short interval. The ore shoots are from 1 to 500 ft. in length, and the amount of silver present increases with the sphalerite and apparently is greatest at the lowest level. The country rock consists of several types of granite-gneiss, penetrated by bands of pegmatite, also a fine-grained felsitic rock, and finally a dark-red biotite granite with copper stains, and with less quartz than in normal granite. The latter type lies over the hanging wall of the Logan vein.

* Abstracted from a paper before the Geological Society of America at the Washington meeting.

THE AMERICAN DEMAND FOR SULPHUR.

By CHARLES C. SCHNATTERBECK.

There are few barometers of trade that can gauge the industrial prosperity of a country so well as the consumption of sulphur and sulphuric acid. Heretofore the demand for sulphur in this country has been satisfied largely by crude brimstone, but since 1896, when the Sicilian miners formed a combination and advanced prices, acid makers in the United States have considered it better policy to burn pyrites. Consequently, in the seven years from 1896 to 1902, with the rapid development of our manufacturing enterprises, the consumption of sulphur in this country has increased over 80 per cent. In 1902 there were consumed 520,537 long tons of sulphur, and of this amount pyrites supplied 337,750 tons, or nearly 65 per cent. In 1896 the sulphur recovered from pyrites amounted to 141,933 tons, showing an increase in 1902 of 195,817 tons, or 138 per cent. This enormous growth in the demand for pyrites sulphur has been due chiefly to the fertilizer-acid trade, headed by the Virginia-Carolina Chemical Company and the American Agricultural Chemical Company. It has also increased the domestic production of pyrites from 109,282 tons in 1896 to 303,746 tons in 1902, or nearly 178 per cent, and the probability is that there will be a further growth in the future. This ore carries from 42 to 44 per cent sulphur, and is mined principally in Virginia, Georgia and Massachusetts. Our imports of pyrites, containing from 46 to 52 per cent sulphur, also show an enormous increase, amounting to about 119 per cent. This heavy import trade is free of duty, and has been encouraged by importers who have taken options on the output of some Spanish pyrites mines in order to grant their customers better terms on long-time contracts. We have imported small quantities of good quality pyrites from Newfoundland and Norway, but Spain is still our main source of foreign supply. It is noteworthy that the market value of imported pyrites since 1896 has fallen in a larger ratio than the advance reported in brimstone. This has naturally favored an increased consumption of pyrites, and should importers succeed in their efforts to supply a larger quantity of non-arsenical ore, it seems likely that those using brimstone exclusively will try pyrites. It is also believed that the sulphite pulp mills which at one time were seriously talking of burning pyrites will be induced to give the matter favorable consideration.

Purchasers of pyrites are also benefited by the market for the metallic cinder after burning the ore. This cinder contains from 1½ to 2 per cent copper when cupriferous ore is burned, and about 40 per cent iron when the ore does not contain copper. Occasionally special metallurgical treatment will recover from $0.50 to $1 and more in gold per ton of cinder.

Our supply of brimstone continues to come principally from Sicily, although we have producing mines in Utah, Nevada, Idaho and Louisiana, and American interests are opening up new mines in Mexico. Recently a little Venezuelan sulphur arrived at New York, but this supply is momentarily suspended by international complications. Imports of brimstone into the United States are free of duty. In 1896, at the time of the organization of the Anglo-Sicilian Sulphur Company, as the brimstone combination is called, the imports into the United States were 145,318 long tons, and they furnished about 49 per cent of the total sulphur consumed here. In 1902, seven years later, the brimstone imports were 176,951 tons, which supplied only 33 per cent of the demand for sulphur. In other words, there has been conceded to pyrites during this period about 13 per cent of the trade which would have been done by brimstone had not sellers advanced prices. True, there has been an increase of about 22 per cent in brimstone imports, but this was due principally to the consumption of best unmixed seconds by the sulphite pulp mills. It should be mentioned here that the sulphuric acid manufacturers, when they use brimstone, buy mostly best thirds, which cost about $1.50 per ton less than seconds, the difference in price being due to quality. The import value of brimstone has advanced about 32 per cent since 1896, and may be taken as an index to the profits that have been made by the combination since its incorporation. The Anglo-Sicilian Sulphur Company has a paid-up capital of £1,035,000 ($5,175,000), upon which good dividends are being paid, and on July 31, 1902, it had a reserve fund of £121,982 ($609,916), of which £57,029 ($285,145) is held for any eventual depreciation of stocks of sulphur.

The table below shows clearly the development of the sulphur trade in America from 1896 to 1902, this period being the more interesting because it illustrates the influence of the extraordinarily high prices asked for crude brimstone by the combination. The figures are in long tons of 2,240 pounds, and the sulphur contained in the crude brimstone has been calculated at 98 per cent pure, and in pyrites at 44 per cent for the domestic ore and 47 per cent for the imported.

	—Brimstone.—		——Pyrites.——	
	1896.	1902.	1896.	1902.
Production	3,800	10,818	109,282	303,746
Imports	145,318	176,951	199,678	437,319
Total	149,118	187,769	308,960	741,065
Exports	484	1,253	.....	3,060
Consumption	148,634	186,516	308,960	738,005
Sulphur content	145,661	182,787	141,933	337,750

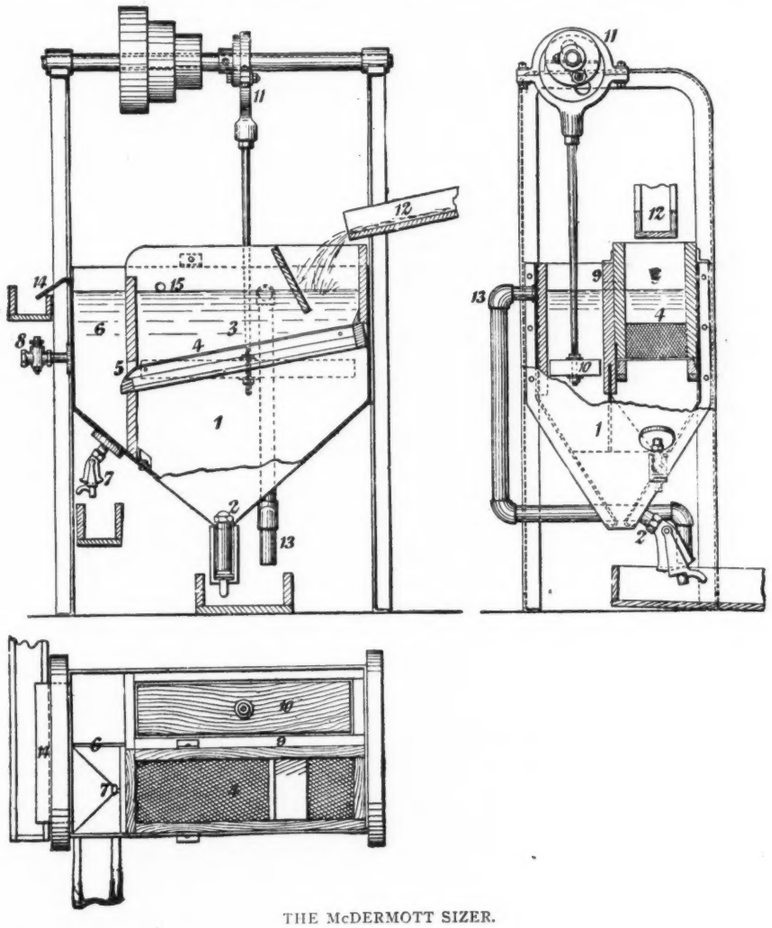
In addition to the above an increasing quantity of sulphur is being recovered from the fumes from roasting blende. Important zinc works at La Salle and Peru, Ill., and elsewhere in the West are producing a good acid in this way, and it is hoped that the industry will grow as prosperous as it is in Germany. In that country most of the large zinc works are equipped with the necessary apparatus for making either sulphuric acid or preparing sulphurous acid from the fumes. The development of such an industry in the United States would also rid many localities of the obnoxious fumes that now devastate vegetation.

Sulphur is also recovered from the spent oxide of gas works, which makes a good acid, often free from arsenic. Some day we may also manufacture large quantities of acid from sulphur recovered from alkali waste, as is done in Great Britain.

NEW COAL MINES IN BELGIUM.—La Societe de Recherches Minieres dans la Campine Limbourgeoise is the name of a company which has been formed in Brussels, with a capital of $75,000, to prospect for coal in Belgian Limbourg.

THE McDERMOTT SIZER.

The accompanying illustration represents a machine invented by Mr. Walter McDermott, of London, and designed for sizing or separating the different sizes of crushed ore before it is fed to the dressing machine. The sizer is controlled by the Wilfley Ore Concentrator Syndicate, Limited. This machine differs from other classifiers from the fact that the separation into the various sizes is effected by means of the submerged screen. Careful tests have proved that there is an absolute freedom of movement of the particles under water, and that the pulp can pass in succession through a series of screens each finer than the preceding one, thus permitting the effective separation into the sizes best adapted for close concentration work, and without any excess of water in the last or slime product.



THE McDERMOTT SIZER.

In the drawings, 1 is a pointed tank with discharge for a regulated flow of water and fine material at 2. The box 3, with inclined screen 4 forming its bottom, rests in the tank 1, but is removable for the purpose of replacing the screen as required. At the lower end of the box 3 is an opening 5, just above the screen surface, and the full width of the latter. The screen terminates in a lip entering the second water tank 6, which is provided with a regulated discharge 7 at the bottom, and a water inlet supply 8. The tank 1 is divided longitudinally in its upper part by the partition 9; one side being occupied by the screen-box 3, and the other compartment being fitted with a loose working plunger 10 operated by an eccentric 11, as in an ordinary jig machine, and arranged to be variable as to its stroke for different degrees of fineness of material to be screened. A very short quick stroke is necessary for fine sizes.

The operation of the apparatus is as follows: The tanks 1 and 6 are retained full of water to a point above the screen surface. The crushed ore and water flows into the upper end of screen-box 3 by launder 12. The discharge 2 is opened sufficiently to maintain the water level at the fixed point above the screen, and this insured by overflow pipe 13. The plunger 10 is set in operation, giving a rapid pulsating motion to the water in the screen-box through the screen bottom. All the muddy water and finest particles of ore are compelled to pass through the screen, and down to the discharge 2. The coarser particles of ore which cannot pass through the screen move down the inclined surface of the latter by a series of rises and falls, due to the pulsations of the water; and they discharge through the opening 5 into the compartment 6, where they fall to the bottom, and run out with a small stream of water by discharge 7.

In order to prevent muddy water and fine sand from flowing into compartment 6 through the opening 5, clear water is introduced into 6 by pipe 8 in equal quantity to (or slightly in excess of) the stream flowing from 7. The effect of this arrangement and regulation is, that all muddy water and sand finer than the holes of the screen, are delivered in a steady stream at 2; while all the particles coarser than the holes in the screen flow off at 7, in a small, regulated stream of clear water. At 14 a flood discharge is arranged in case of blocking of screen or sudden inrush of pulp at 12.

Although in appearance the apparatus resembles at first sight a jig, it is both in details and function entirely distinct from this well-known machine, as will be evident on examination. In a jig the function of the screen—which is placed level and not inclined—is to support a bed of heavier material than the waste rock to be separated; and on this bed is maintained a layer of the particles of ore to be treated of a depth of several inches. There is no discharge of the whole of the muddy water and sand finer than the screen through the latter; but the muddy water flows off with the fine sand at the end of the screen-box, over a partition which regulates the depth of ore retained on the screen. The bed of heavy material, retained on the screen, prevents the passage of small particles of lighter rock from passing down to and through the screen. The function of the pulsation of the water in a jig is to lift and allow to fall the whole depth of material on the screen, so as to stratify the ore according to specific gravity of its component parts; keeping the light rock or waste at the top, and forcing it over the end partition with the muddy water as fresh ore flows in and raises the level of the bed of particles, which by its motion keeps horizontal at the surface. The particles which work down are those having the greatest specific gravity, not the smallest size. In this invention the use of the water pulsations is solely to keep the screen from clogging, and the same result may be attained by giving to the inclined screen 4 a quick shaking or vibratory motion. It follows from the arrangement described that the muddy water and fines are delivered continuously, without any addition of wash water as in other screening operations.

The pulp can pass in succession through a series of screens, each finer than the preceding one, without any excess of water in the last or slime product. The screen being submerged is not subjected to any severe friction of the coarser particles moving down its surface, and so will have a reasonable life. Tests made on wire cloth of 80-mesh, and even on 100-mesh, show effective separation into sizes well adapted to close concentration work. There is an absolute freedom of movement of the particles under water which cannot be obtained by any screen with wash water sprays to keep the material from clogging together, and therefore nearly perfect screening is effected. A comparatively small screen surface under water, with its openings kept free by the rapid pulsations of the water, has a surprisingly large capacity relative to its area. If it be desired to avoid excess of water in the discharge of the coarse particles at 7, a screw or perforated bucket elevator can be introduced into the compartment 6, so as to avoid the open discharge at the bottom, with consequent steady stream of water.

In certain cases of losses from a single treatment on Wilfley tables, it is desirable to re-treat for the little fine slime mineral escaping, and such retreatment can be most effectively done by a second working on tables, if the coarser sand be removed. The use of the sizer, with a fine screen would enable this to be perfectly accomplished. Where the coarsest particles of rock might pay for a regrinding, to free attached particles of mineral, two sizers could be used, the first delivering a product to the grinders, the second dividing into waste sand and slimes for redressing. In cases where the tailings, on account of large quantity or low value, do not warrant the use of additional tables, the sizer, by taking out all the coarser sand, will give a slime product (well suited to treatment on revolving buddles, frames or canvas tables), without the excess of water so detrimental to good work.

BRIQUETTES IN INDIA.—The Indian Northwestern Railway Company is now burning in its locomotives, briquettes, made at Quetta, with coal from the Khost mines. An additional plant is being erected at Haranpur.

BOGOSLOVSK IRON WORKS, RUSSIA.—A description of these iron works was recently published in the *Zeitschrift des Vereines Deutscher Ingenieure*, by Herr Stark. After a historical review of the development of these works, which are in the Ural region, the writer says that at the present time the plant has four blast furnaces, using charcoal for fuel and running magnetic ores from neighboring mines. The furnaces each produce about 35 tons of pig iron a day. There are four open-hearth steel furnaces, each of 15 tons capacity, a steel foundry, a forge and a rolling mill. The highest production of these works was in 1901, when 48,000 tons of steel rails were made. The mines are well situated to supply the eastern section of Siberia, being near a navigable stream which runs into the Obi River.

THE HILL IRON ORE LANDS ON THE MESABI RANGE.

In view of the interest in the present situation in the Lake Superior region, we reproduce below a carefully prepared statement in relation to the Hill properties on the Mesabi Range in Minnesota, for which we are indebted to the Cleveland *Iron Trade Review:*

Reports have been published, particularly in the past two months, of the acquisition of the Hill ore properties on the Mesabi Range by the United States Steel Corporation. The negotiations to that end have been a matter of general knowledge, but it is understood that the transaction has not been consummated. It seems to be taken for granted, however, that these properties, on some terms, will pass under the control of the Steel Corporation at an early date. This does not necessarily involve their purchase outright, nor does it involve the payment of money at the present time. The terms talked of have been rather widely discussed, and some of the current reports in this connection appear to be quite close to the facts. It is well understood, for example, that Mr. Hill is to receive for his ore what amounts to $1.80 a ton at Superior docks, which would mean $1 a ton for the ore in the ground—the valuation the Steel Corporation puts on its own ore as appears from President Schwab's affidavit in the recent bond issue litigation.

The prime feature of any deal Mr. Hill makes will be tonnage for his Eastern Minnesota road, which in 1902 hauled to the Superior docks 4,180,568 tons. It is understood that in acquiring control of the Hill ore properties the Steel Corporation will not pay any bonuses, nor will it necessarily mine ore every year the contract is in operation. Mr. Hill requires a certain stipulated ore tonnage for the Eastern Minnesota road; if mines other than those in the proposed deal furnish that amount, the Steel Corporation will not be required to furnish any; but it must furnish whatever is lacking of the stipulated amount. This minimum tonnage for the Eastern Minnesota is raised year by year under the proposed contract, until it ultimately reaches 10,000,000 tons. And even then the Steel Corporation need not mine Hill ore, if from other sources 10,000,000 tons should be shipped over the Eastern Minnesota. The importance of the acquisition of the Hill properties by the Steel Corporation may be inferred from the details given below:

The J. J. Hill interests on the Mesabi Range have been in process of accumulation for the past five years, during which time a consistent policy has been pursued, until these properties have reached an extent second only to the holdings of the United States Steel Corporation, and are sometimes estimated as high as 400 to 500 million tons. These holdings are pretty well concentrated, and while many of them are leased to operating and independent steel making concerns, much of the land and many of the located ore bodies are still in Mr. Hill's hands for such disposition as may be desired. Up to a few months ago Mr. Hill and his companies were actively negotiating for lands east of the central and western part of the Mesabi Range, going so far as to carry on negotiations for Vermillion Range lands, but at that time a division of territory was agreed upon between Hill and the largest other interest in this district, and he withdrew and has since confined himself to that part of the Mesabi west of T. 58, R. 18.

The bulk of the Hill holdings were secured by the puchase, four years ago, of the Wright & Davis lands and the Duluth, Mississippi River & Northern Railroad, a line built by Wright & Davis for carrying out a logging contract. This road reached from Hibbing to the Mississippi River and connected with the Lake over the Duluth & Winnipeg road, which had an ore dock at Superior. The Wright & Davis lands, bought for their pine timber, were stretched across T. 57, R. 21, along the ore-bearing formation, and included both the Mahoning and Stevenson mines. At the time of the sale to Hill the Mahoning was in operation and the Stevenson had been discovered, though but comparatively little other ore was absolutely known to exist on the lands. The price paid for these mines and the railroad, as well as the enormous and very profitable logging contract held by the road, was a trifle under $4,000,000. It now seems a mere bagatelle; but at that time money was very tight and the present conditions were unexpected.

Mr. Hill did not acquire additional lands for some time. He bought the Duluth & Winnipeg road, paying par for the $1,000,000 of stock issued, which stock represented actual cash that had gone into the construction of the road, and taking up the less than $1,000,000 of the underlying bonds that had been issued by the road to pay for lands supposed to contain ore, but which were north of the ore-bearing formation. Some ore lands were gradually secured until the formation of the United States Steel Corporation, with its control of the two remaining roads reaching the Mesabi Range. Mr. Hill at once saw that to make his road profitable he must have ore of his own sufficient to maintain his road at a high pitch of traffic, as the corporation's roads would haul its ore and as much more as it could get, and he expected the corporation to continue the acquirement of undeveloped ore lands. This, however, it did not do immediately. The field was for a time left to him, and he improved the situation. With abundant funds obtainable at the lowest rates the Eastern Minnesota road, which was the title of the Hill line, began buying leases and fee tracts by the wholesale, but very quietly. The stocks of many companies owning lands upon the ore-bearing formation were secured at low prices, State leases were bought at advances over the royalties demanded, and many tracts were taken outright. In the meantime, a very considerable exploring business was carried on, and tracts were examined with the drill all along the range as far east as the Mountain Iron Mine in the center of T. 58, R. 18. All the lands belonging to the Midway Company and located on the ranges in towns 58 and 59, R. 18, were bought outright, though they were not known to contain ore of value.

The Hill companies now control a strip of land six miles long on the strike and more or less continuous across the width of the ore-bearing formation in T. 57, R. 21. In this are the Mahoning, Stevenson, Leetonia, Burrows and several other ore-bodies of importance, and a large area of unexplored land of possible high value. By the advance of cash for the purchase of other lands it also controls the traffic on several additional ore-bodies in the same township.

It has been a favorite method of Mr. Hill to assist intending buyers of ore mines to a part of the cash required, in return for a contract for the traffic at going rate; and this has tied up to him a large amount of ore outside of his own ownership. Another method that has had the same result has been to permit the exploration of lands of his own under the royalty basis, in return for the traffic that the intending explorers might hold in their own ownership. This has brought to him large contracts for freight.

Hill holdings west of T. 57, R. 21, include large fee tracts, State and private leases of more or less value. The value of the range as one passes westerly is problematic, and much of the formation there is probably worthless for ore.

To the east of T. 57, R. 21, there is considerable tonnage north and east of Hibbing in T. 58, R. 20, under his control. This includes the Webb, Laura and Winnifred (the last two, which are Louis Hill properties, being recently leased to Corrigan, McKinney & Co.), the Pearce & Morrow, the Clark & Chisholm, some Alworth lands, the Jordan & Croxton, and a few other small tracts, the last of which are still held untaken by mining companies.

In T. 58, R. 19, the Wabigon and Wacouta iron companies, which hold large tracts, one of fee the other of State leases, are owned by this same interest. It has the traffic of the Grant, the Sharon, the Kinney, the Maitland, and other properties, and holds a large acreage of lands.

In T. 58, R. 18, all the Midway lands in the northwest part of the township are Hill-owned now, together with numerous other tracts, some of which are known to contain ore. It also has lands on the formation in the south part of the township north of this.

Mr. Hill owns no mines and controls no traffic east of the northwest corner of T. 58, R. 17, where are the Commodore and Sauntry mines, shipping over his line, and several tracts of lands on which ore is known to be, but which have not been leased to operators.

In addition to these holdings, Mr. Hill is practically master of the old State grant lands of the St. Paul & Duluth road, which went into the possession of the Northern Pacific when that road bought the other two years ago. These lands are controlled by the Northern Security Company, and in that way are under Mr. Hill's dictation. These are probably of less value than the properties mentioned before.

DIRECT CONVERSION OF CHARCOAL INTO DIAMOND

Dr. Albert Ludwig has experimented upon this subject (*Chemical News,* LXXXVII, p. 1, January 2, 1903), and has been able to show that under strong gaseous pressure (pressures up to 3,100 atmospheres being used) the formation of diamond results either at a lower temperature in presence of iron, or at the melting point of carbon without using such a contact agent. An iron spiral was imbedded in powdered retort carbon and raised to red heat by an electric current in an atmosphere of hydrogen at high pressure. A few minutes after the current began to pass, the low resistance originally caused by the conducting carbon rose to the value of the resistance of the iron spiral. All transparent elementary bodies are non-conductors of electricity, and if charcoal be converted into diamond the change can be recognized by this alteration in property. In the experiment the charcoal in contact with the spiral had become a non-conductor, and examination showed on some of the little pieces of carbon bright glittering crystals with the specific properties of diamond. They manifested strongly pitted surfaces, calling to mind Moissan's diamonds.

Numerous experiments showed that in order to convert charcoal to diamond without the presence of iron it is necessary to melt the carbon under very high pressure. In fact, it was successfully proved that molten carbon is non-conducting and therefore is diamond. At the gaseous pressures used in this case the carbon melts very easily by the help of a metallic arc lamp, and it was obtained in small spheres, about the size of a pea, of great hardness, and having the crystalline structure of natural carbonado. This method might be used to prepare diamonds on a large scale, even to enter into competition with natural diamonds if certain easy conditions be maintained.

In an experiment wherein powdered carbon was mixed with different silicates and exposed for 15 minutes to the action of a strong arc (under strong pressures) all the carbon remained in the free state. From this it may be deduced that at the high gas pressures occurring at a temperature at which carbon is melted no carbide can be formed. This explains the non-existence of silicon carbides in nature.

A LARGE PENSTOCK PIPE.—The Struthers-Wells Company, of Warren, Pa., has just received a contract from a Canadian company for a penstock pipe 9 ft. in diameter and about 450 ft. long, to be erected at Shawinigan Falls, Quebec. The pipe will be constructed of 3/8 and 7-16-in. steel, and will probably be shipped from the shop in sections of 30 ft. This is the third large penstock pipe installed by the Canadian company at this point. The water is conveyed through the pipe under a head of 90 ft., and by the employment of turbine wheels is used to generate power, a portion of which is used at the falls, but the larger portion of which is to be conveyed to Montreal, approximately 90 miles distant, for lighting and power purposes.

BAUXITE MINING IN ARKANSAS.

The Pittsburg Reduction Company is now mining bauxite at Bauxite, in Saline County, Arkansas. While much work has been done there, the plant at the mines is still incomplete, though its construction is being pushed.

The method of drying the ore is to wash a part of it to remove the free silica. A large amount of it can be used without washing. A part of it is dried and the balance calcined. In drying a cylindrical dryer is used, the furnace being fired with wood. In calcining a 60-ft. rotary calciner is used, fired with gas generated in a 10 by 12-ft. Duff's patent water-seal gas producer. The ore is all ground on a series of coarse and fine crushers, and handled by elevators and conveyers from the tram cars into the cars for shipment.

They are preparing to put in another calciner and gas producer as early as possible. In the plant the very best material and machinery is used, and everything is arranged for the handling of the ore by machinery as much as possible. The plant is supplied with shops and machinery for building its tram cars, etc. The company also has near the mining plant its own sawmill and planing mill, in which is manufactured the lumber for buildings. The company has already built over 30 houses for workmen, and is building more. There is a fine electric light plant installed, and first-class fire protection, with standard fire plugs and hose, well situated. The company is also building an ice plant for its own use, with a cold storage room attached.

Bauxite mining in Arkansas is still in an undeveloped state, and the little work that has been done is not sufficient to test the depth of the ore, or the character of the underlay, nor to give an idea of the amount of ore in this region.

The new alumina plant under construction by the Pittsburg Reduction Company, at East St. Louis, Ill., is nearing completion, and will be in full operation in a couple of months. It will be the most complete plant of its kind in the country, as only the best materials and machinery of all kinds have been used in its construction.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DEPARTMENT RULE REGARDING TIMBERS FROM MINING LAND OF GOVERNMENT.—The rule of the Secretary of the Interior that one who takes timber from the mineral land of the United States under the act of June 3, 1878 (U. S. Comp. Statutes, 1901, p. 1428), shall not sell or dispose of it without taking a written agreement from the purchaser that it shall not be used except for building, agricultural, mining or domestic purposes within the State or Territory, requires the seller to take the agreement before or at the same time when he sells or disposes of the timber, and obtaining the written contract three months after the sale and delivery is not a substantial compliance with the rule.—United States v. Gentry (119 *Federal Reporter*, 70); United States Circuit Court of Appeals, Circuit 8th.

SUIT ON ADVERSE POSSESSION MAY NOT BE CONTINUED BECAUSE AMENDED.—A complaint in a suit to determine an adverse claim to a mining location alleged that he was in possession of a portion of the claim described and of all the veins having their apices therein, and that such veins passed out of the side lines and end lines in their dip into the earth in a portion of a claim owned by other parties—the defendants—and that he was entitled to possession of the entire vein, but that such parties claimed to that part outside of the boundaries of his claim. It was held that an amendment to the complaint at the close of the evidence by so changing, as to include all the veins having their apices within that part of the original location which had been conveyed to him and which passed through one or both end lines of the claim, and incorporation of a claim of title and possession to a triangular piece of ground in a corner of the claim of the others, in which it was alleged that they were committing trespass on his ore, part of the same facts, did not present a new issue entitling the others to a continuance of the case.—Montana Ore Purchasing Company v. Boston & Montana Consolidated Copper & Silver Mining Company (70 *Pacific Reporter*, 1114); Supreme Court of Montana.

SUIT BY STOCKHOLDER IN MINING COMPANY TO ENJOIN CONTROL.—A suit in a State court by a stockholder of a domestic corporation which is a citizen of the same State, against such corporation and a foreign corporation, the purpose of which is to enjoin the latter from obtaining and exercising control over the property, business, and corporate stock of the domestic corporation, does not involve a separate controversy between complainant and the foreign corporation, which gives the latter the right of removal. Such suit is necessarily based entirely upon the rights of complainant as a stockholder of the domestic corporation, and to every controversy between him and the foreign corporation involving such rights, the domestic corporation is a necessary party. Where the bill in such suit alleges such foreign corporation is about to be accomplished through an illegal conspiracy between the defendants, the domestic corporation is not a party in the same interest with the complainant, and cannot be aligned with him for the purpose of giving the foreign corporation the right of removal on the ground of diversity of citizenship.—McGinniss v. Boston & Montana Consolidated Copper & Silver Mining Company (119 *Federal Reporter*, 96); United States Circuit Court of Appeals, 9th Circuit.

ABSTRACTS OF OFFICIAL REPORTS.

Republic Iron and Steel Company.

This company's latest report covers the half-year ending December 31, 1902. At that date the capital stock outstanding was $47,547,900. The earnings for the half-year were as follows, comparisons being made with the second half of 1901:

Second half of 1901:	1901.	1902.		Changes.
Net earnings	$1,419,550	$2,091,888	I.	$672,338
Renewals and repairs	$486,426	$707,765	I.	$221,339
Dividends	711,617	712,492	I.	875
Total deductions ..	$1,198,043	$1,420,257	I.	$222,214
Balance	$221,507	$671,631	I.	$450,124
Previous surplus	1,109,666	1,934,389	I.	824,723
Total surplus	$1,331,173	$2,606,020	I.	$1,274,847

President A. W. Thompson says in his report: "The surplus has again been substantially increased, so that at the close of the year it amounts to $2,606,021, the increase accumulated during the six months last past, remaining after the payment of preference dividends, amounting to $671,631, as against $221,507 during the corresponding period of the previous year. This result would have been still more favorable had the transportation facilities of the country kept pace with its industrial developments.

"For some time past it has been the settled policy of the management constantly to strengthen the company by extending in a large way their holdings of raw material. At the same time it has also been the policy of the company not to increase capitalization, either by the issue of additional capital stock or bonds, but to pay for these extensions out of profits. That this policy has always been pursued within proper limits of safety is apparent from the fact that, although such new construction and new acquisition of raw material entailed a total expenditure of $5,282,670, the quick assets of the company on December 31 last still largely exceeded the accounts and bills payable of the company.

"At the time of the organization of the company the holdings of Northern ore amounted to only 2,500,000 tons, and at the end of the last preceding fiscal year, June 30, 1902, this tonnage had been increased to 15,325,000. Since then we have acquired other mining interests, so that now our ore properties are equivalent to at least 19,000,000 tons, an amount equal to the present requirements of our Northern furnaces for 30 years and more. For its Southern furnaces the company owns such vast supplies of ore and coal as to render further acquisitions in that direction unnecessary.

"All the properties of the company have been maintained in the highest condition. All improvements have been charged to operating expenses or depreciation. None of the plants have depreciated since the organization of the company, and they represent a value far in excess of that of the various properties at the time of the organization of the Republic Iron & Steel Company. Since the publication of the last report three new continuous mills of the Morgan Engineering Company's best type have been installed at the Youngstown works, two of which are now in successful operation and the third will be put into service within a few weeks, the results of which will soon be manifested in increased profits. A substantial increase in the net earnings of the company may be expected during the coming six months."

Pittsburg Coal Company.

This company, which was a consolidation of the railroad mines of the Pittsburg District, owns and operates a large number of mines in that district, and also several collieries in the Hocking Valley field in Ohio. The report for the year 1902, submitted at the recent annual meeting in Pittsburg, shows that the profits from operations for the year were $5,753,913. From this there were deductions of $396,666 for depreciation of equipment and $650,660 for royalty account. This last named account is intended to provide for the exhaustion of coal in the company's property, and is calculated on a basis of $400 for each acre of coal mined out, not including that taken from leased tracts. Making these deductions the net profits were $4,706,587, showing an increase of $1,607,049, or 51 per cent, over the year 1901. The payment of interest on bonds and dividends on preferred stock required the sum of $2,427,146, leaving a balance of undivided earnings, amounting to $2,279,441. This sum is appropriated for additional working capital and to meet other possible requirements.

The balance sheet on December 31, 1902, may be summed up as follows:

Preferred stock	$29,701,200
Common stock	30,308,200
Funded debt	9,803,124
Coal royalty fund	2,054,422
Depreciation reserve fund	1,400,051
Undivided earnings	5,467,494
Accounts and bills payable	7,885,445
Total liabilities	$86,619,936
Coal lands, plant, equipment, etc.....	$77,138,406
Stock in other companies	105,646
Coal and other merchandise on hand	1,933,576
Cash, accounts and bills receivable	7,442,308
Total	$86,619,936

Of the bonded debt given above, $6,000,000 consists of Pittsburg Coal Company bonds, dated February 1, 1902, paying 5 per cent interest, and payable in yearly installments running over six years. The bonds of subsidiary corporations absorbed amounted to $1,565,223, and mortgages on coal lands and other property to $2,237,901.

The coal mined by the company during the year was as follows, in short tons:

	1901.	1902		Changes.	%
Pittsburg District	11,939,501	13,526,355	I.	1,586,854	13.3
Hocking Val., O.	1,225,614	1,381,996	I.	156,382	12.8
Total	13,165,115	14,908,351	I.	1,743,236	13.2

The increase in production is more remarkable from the fact that production was seriously hampered throughout the year by the freight congestions on the railroads. There were only occasional periods of relief.

During the year the acquisitions of the company were as follows: 15,551 acres of coal and 939 acres of surface lands in the Pittsburg District; 1,956 acres of coal and 1,798 acres of surface land in the Hocking District, being in addition to the purchase of

the New Pittsburg Coal Company and the Greendale Mining Company properties; all the property of the Midland Coal Company, including 400 miners' houses and three operating mines in the Chartiers Valley, and a 40-year lease of about 5,000 acres of coal owned by the company, and the capital stock of the National Dock and Fuel Company, subsidiary to the Midland Company and engaged in a lake shipping and fueling business at Cleveland and Erie; control of the Pittsburg & Castle Shannon Railroad Company, including ownership of several hundred acres of coal convenient to, and adapted to, Pittsburg domestic requirements; entire capital stock of the Colonial Coke Company; additional equipment of improved type for all mines where it can be advantageously used; 520 railroad cars of 40-ton carrying capacity, part of which were built at the Montour shops of the company; controlling interest in the Milwaukee-Western Fuel Company, a consolidation in the preceding year of five concerns owning and operating 11 docks and yards in Milwaukee; controlling interest in the Western Coal and Dock Company, Waukegan, Ill.

President Robbins, referring to the increase in earnings and production, says that the results have been attained in large measure through continuance of the policy of acquiring additional coal lands to preserve intact the holdings, and of acquiring additional facilities for broadening the markets and securing new ones. He says that the company's ownership of facilities on the Lakes is not only the means of outlet for the company's entire production, but gives it control of many thousand accounts direct with consumers of the company's output, besides income from handling charges and selling commissions on a large per cent of the anthracite marketed in the Northwest.

The president states that in the purchase of the Colonial Coke Company not only did the company secure a modern plant of 130 ovens, but a key to 8,000 acres of contiguous coking coal, which the Pittsburg Company proposes to develop to meet active demand for coke. With 270 additional ovens contracted for, the output of this coking plant will be over 800 tons a day. Reference is made to large and valuable contracts which the company failed to fulfill during the year through inadequate railroad service, the report adding that enforced idleness at mines has swelled the cost of production.

An appended report of J. E. McDonald, secretary and treasurer of the Pittsburg Coal Company Employees' Association, is full of interest at this time. The report says that at the end of November, 1902, there were 1,949 employees making monthly payments on a total of 7,723 shares of the preferred stock, their payments, plus earnings, on the date mentioned, aggregating $169,309. It is estimated that by the plan of this association, by which earnings of the fund are invested and reinvested, employees will not be required to pay more than $60 a share for the preferred stock.

Interesting information is given in relation to the death and accident benefit and pension fund, which was started last year. Eighty-five per cent of the employees of the company have become attached to benefit lodges. The company agrees to contribute a third of the accident benefits, the relief lodges paying other benefits in which the company does not participate.

The Pittsburg Coal Company will contribute $10,000 as the initial payment for 1,000 shares of preferred stock of the company, to form the principal of a pension fund, and in addition will pay 1c. per month for each employee, to maintain the said fund, it being provided in the by-laws of the accident and death lodges that the employees should pay into this fund the amount of 2c. per month per man; any employee who shall have worked for the company 10 years continuously and made continuous payments to the relief fund, and who, through old age or other disability, is unable to earn a livelihood, upon proper certification by the officers of the relief lodge to which he belongs, to be entitled to receive a pension of $10 per month during the balance of his life.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Atlas of Western Canada. Compiled and issued by direction of Hon. Clifford Sifton, Minister of the Interior. Ottawa, Canada. Pages, 44; with maps.

Report of the State Bureau of Mines of Colorado. 1901-1902. Harry A. Lee, Commissioner of Mines. Denver, Colo.; State Printers. Pages, 310; with map.

Delaware Corporations. By Josiah Marvel. Address delivered before the Department of Finance and Economy, University of Pennsylvania. Pamphlet, 24 pages.

Lead and Its Compounds. By Thomas Lambert. London; Scott, Greenwood & Co. New York; the D. Van Nostrand Company. Pages, 228; illustrated. Price, $3.50, net.

Concerning Iron-making; with Special Reference to the Buffalo & Susquehanna Iron Company. By Elisha Walker. New York and Boston; Fisk & Robinson. Pages, 44; illustrated.

Die Herstellung von Metallgegenstanden auf Elektrolytischen Wege und die Elektrogravure. By Dr. W. Pfanhauser. Halle-a-S., Germany; Wilhelm Knapp. Pages, 146; with 101 illustrations. Price (in New York), $2.50.

Electricity as Applied to Mining. By Arnold Lupton, G. D. Aspinwall Parr and Herbert Perkin. New York; the D. Van Nostrand Company. London; Crosby Lockwood & Son. Pages, 280; with 170 illustrations. Price, $3.50, net.

Compressed Air Information. A Cyclopedia Containing Practical Papers on the Production, Transmission and Use of Compressed Air. Edited by W. L. Saunders. New York; published by *Compressed Air.* Pages, 1,176; illustrated. Price, $5.

Siderology: The Constitution of Iron Alloys and Slags. By Hans Freiherr von Juptner. Translated from the German by Charles Salter. London; Scott, Greenwood & Co. New York; the D. Van Nostrand Company. Pages, 344; illustrated. Price, $5, net.

Einrichtungen von Elektrolytischen Laboratorien unter besonderer Berucksichtigung der Bedurfnisse fur der Bedurfnisse fur die Huttenpraxis. By H. Nissenson. Halle-a-S., Germany; Wilhelm Knapp. Pages, 52; with 32 illustrations. Price (in New York), 85 cents.

The Engineer of the Twentieth Century, Response to a Toast at the Twenty-fifth Anniversary of the Engineers' Club of Philadelphia. By Charles F. Scott, President of the Engineers' Society of Western Pennsylvania and of the American Institute of Electrical Engineers. Pamphlet, 24 pages.

BOOKS REVIEWED.

Compressed Air Information. A Cyclopedia Containing Practical Papers on the Production, Transmission and Use of Compressed Air. Edited by W. L. Saunders. New York; published by *Compressed Air.* Pages, 1,176; illustrated. Price, $5.

This is a compendium of the large amount of interesting and practical matter concerning the production, transmission and use of compressed air, gathered together in convenient form from the issues of that useful little magazine entitled "Compressed Air," the value of which has been recognized by engineers and keenly appreciated by the numerous friends of the well-known editor, Mr. W. L. Saunders, of the Ingersoll Sargeant Drill Company.

This thick book of over a thousand pages will appeal to the practical man because of the character of the material which it contains. It deals with practical matters as discussed by engineers familiar with the handling of the particular apparatus used in the application of compressed air, and it has been edited by a recognized specialist of high character. This is the highest praise possible for a technical publication, and we feel no hesitation in commending the book to those who are interested in this branch of engineering.

Standard Guide to the City of Mexico and Vicinity. Third Edition, 1903. By Robert S. Barrett. Mexico City and New York; *Modern Mexico.* Pages, 200; profusely illustrated. Price, 50 cents.

Two or three years ago we noticed the first issue of this guide, and the present edition, we find, has been very thoroughly revised and brought up to date. It is a complete guide to the City of Mexico and to the neighboring towns and districts in the Valley of Mexico, and can be used to advantage by travelers and those visiting the region. In fact, it furnishes some interesting reading to those at a distance who desire to get some idea of the country, as well as to those who may actually visit it.

University of Texas Mineral Survey. Bulletin No. 5. Minerals and Mineral Localities of Texas. By Frederick W. Simonds. Austin, Tex.; Published by the University of Texas. Pages, 104.

This bulletin is devoted to a list of different varieties of minerals found in Texas with the localities where they are found, and some brief particulars with regard to their occurrence. In the first and larger part of the book the minerals are given in alphabetical order, while in the second part a list of counties is given with the minerals found in each. Brief articles on the general character of the minerals and the commercial aspect of certain ores conclude the publication. Partial lists have heretofore appeared, but this is the first attempt at a complete statement of the kind. It shows a very great variety of minerals, including a number of commercial value. It will be very useful to all who are interested in the resources of the State as well as the geologist and mineralogist in general.

We may add that the Survey has in preparation several other bulletins, the more important of which will include clays and the clay industry, cements, building stones, underground water and irrigation.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Antimony Smelting—A Correction.

Sir.—With reference to the new method of antimony smelting referred to in your issue of January 31, the name of the inventor and patentee of the process is incorrectly given as T. C. Anderson. It should be T. Crisp Sanderson. The process has now been in successful use for upwards of a year. I trust you will permit me to make this correction.

T. C. SANDERSON.

Staten Island, N. Y., Feb. 2, 1903.

Electrical Manufacture of Iron and Steel.

Sir.—We are preparing at the present time a study on the manufacture of pig iron, steel and raw iron by electricity, and we are very anxious to obtain all articles and records of experience in this line which can be had. We would, therefore, like to appeal to your readers who may be able to aid, by information or by references to papers, in this work. We should be much pleased to give credit to all who may furnish us with such notes or information. We trust that you will convey this notice to your very large number of readers.

PAUL RENAUD,
Technical Director, *Le Mois Scientifique et Industriel.*
Paris, France, Jan. 25, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Magnesia.—Can you furnish us with or refer us to information in regard to magnesia? The method of obtaining same and of manufacturing it into articles for use other than medicinal. Can it be extracted from dolomite limestone successfully and economically?—S. J. S.

Answer.—Magnesia for uses other than in medicine is chiefly obtained from the mineral known as magnesite, which is mined to a limited extent in this country, chiefly in California. The supply, however, comes mainly from abroad. The greatest quantity brought to this country comes from the mines of Euboea in Greece. Magnesite is largely composed of magnesia, with some silica, alumina and lime; the magnesia can be much more cheaply and easily obtained from this material than from dolomite, which carries a very high proportion of lime, and in fact, is a magnesian limestone.

Magnesite.—In your quotations you give magnesite crude at $6.50 to $7 per ton, and calcined at $17.50 to $18. What is the cost of calcining, or what goes to make up the difference in price?—W. B. M.

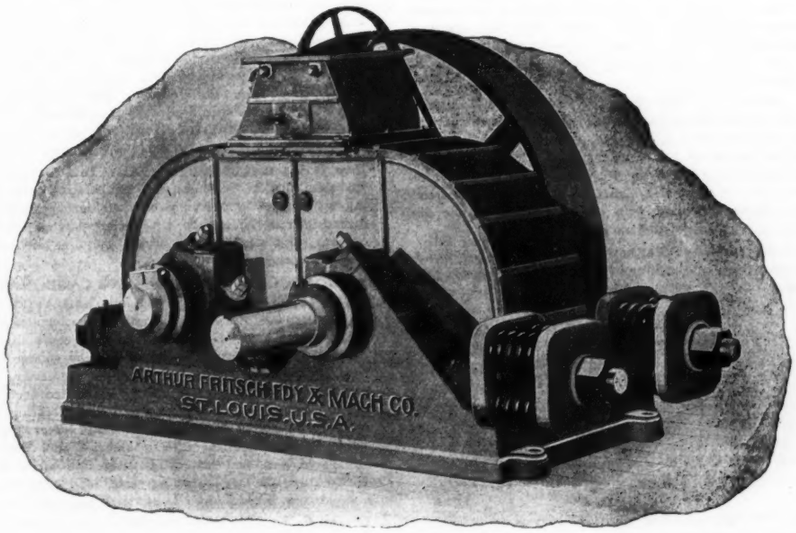
Answer.—The crude or lump magnesite commands a lower price, partly on account of the cost of calcining and partly because the calcined mineral is in powder, clean, free from impurities, and ready for general use. The percentage of magnesium oxide or magnesia is much higher in the calcined than in the crude. Hungarian calcined magnesite carries from 90 to 92 per cent MgO. At the Greek magnesite mines until recently, roughly built kilns fired by wood were employed for calcining the ore, which required a large quantity of fuel. In recent years, however, modern shaft calciners have been built and a soft lignite coal is used. When calcined, magnesite falls into powder and is apt to choke the lower or cooler portion of the kiln, preventing the access of air and heated gases to the upper portion. The shaft furnaces are constructed to overcome this result. The quantity of fuel required is from 15 to 20 per cent of the weight of magnesite. In some cases the calcining is done in a double-hearth reverberatory furnace where the flame is brought into direct contact with the freshly charged magnesite on the upper hearth, the operation being completed on the lower hearth, which is the hotter of the two. The cost of calcining magnesite varies according to locality.

NEW IRON MINES IN SPAIN.—An important deposit of iron ore is reported to have been discovered at Almohaja in the Spanish Province of Teruel.

THE FRITSCH CRUSHING ROLLS.

The accompanying illustration shows a type of crushing rolls made by the Arthur Fritsch Foundry and Machine Company, of St. Louis. These rolls are of very heavy build, and are mounted upon a solid base cast in one piece. The bearings of one of the rolls are cast on the base, while those of the other roll are movable slides, planed in the same base.

Two batteries of powerful springs hold the rolls truly to their work, with a uniform crushing pressure. These springs also serve as a guard against injury to the rolls, should a piece of drill steel, sledge or other foreign substance be fed into the hopper with the ore. Injury to the rolls is also guarded against by means of projections cast on the movable pillow blocks, and which fit rather loosely into slots planed in the base, thereby permitting the movable rolls to obtain a slight universal motion and allow the passage of any hard or unyielding foreign substance which might, either through carelessness or accident, be fed into the hopper.



FRITSCH CRUSHING ROLLS.

A side adjustment of the rolls is effected by means of turning the split collars on the threaded portion of the roller shafts, which project beyond their bearings. The stability of the rolls is insured by tightening the collars on the shafts. The space between the rolls is regulated by means of distance plates, placed on the tension rods. These are removed from time to time to compensate for wear on the shells. The main journals are equipped with ring oilers. The automatic feed hopper, which is furnished with the rolls (unless otherwise specified), is supplied with plates of various size openings, thereby permitting the operator to obtain any desired feed. Should it so happen that the surfaces of the shells wear uneven, the cheek plates may be adjusted so as to distribute the ore upon any desired portion of the shells.

The rollers may be removed without disturbing the adjustment of the springs, by removing the journal cap and lifting the roll and its bearing out, leaving the pedestal unchanged in its position. The housing is provided on each end with a canvas curtain, which permits of instant inspection of the roll shells or other inner parts. The roller cores are slightly tapered and are made in sections. One-half of each core is securely shrunk and keyed onto the shafts. The other halves are split in eight sections. These sections are securely drawn on by means of bolts, thus insuring a tight and perfect fit for the shells. This method also permits the replacing of old shells by new ones in a simple and speedy manner. These rolls are equipped with either rolled steel, chilled iron or cast steel shells, and are made in various sizes.

PATENTS RELATING TO MINING AND METALLURGY.

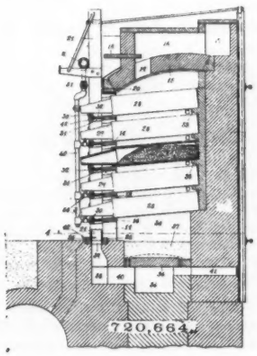
UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending February 17, 1903.

720,600. FUEL COMPOUND.—Henry W. Morrow, Wilmington, Del., assignor to Perfect Fuel Company, Wilmington, Del. A fuel compound consisting of carbon particles, earthy matter, and acidified saccharine matter.

720,664. ZINC-SMELTING FURNACE.—Joseph P. Cappeau, Joplin, Mo. The combination with a zinc-smelting furnace, of a series of air-pipes arranged at intervals at the front of the furnace, a main air-passage adjacent to the



lower ends of the air-pipes, communicating with them, and open at its end to the outer air, and discharge-ports in the air-pipes communicating with the interior of the furnace adjacent to the retorts, whereby air is conveyed to the furnace by a natural draft and distributed at numerous intervals to the furnace adjacent to the retorts.

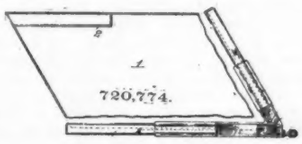
720,670. PROCESS OF MANUFACTURING LEAD PIGMENTS.—Andrew C. J. Charlier, Glasgow, Scotland. A process for the production of white lead from litharge consisting in submitting litharge, in contact with acidified water, to the action of carbon-dioxide gas at a pressure of about 200 lbs.

720,739. ARTIFICIAL STONE.—William G. Roach and Albert C. Roach, Cincinnati, Ohio, assignors to three-fifths to Henry C. Yiester and Otto H. L. Wernecke, Cincinnati, Ohio. A process of manufacturing artificial stone blocks, which consists in fusing clay, sand and lime together, casting same in heated molds, then annealing to produce a crystalline aggregate structure.

720,741. ELECTROLYTIC DIAPHRAGM AND PROCESS OF MAKING SAME.—Hugh Rodman, Philadelphia, Pa. A porous, electrolytic diaphragm of hardened, inert gum or rubber from which some soluble substance has been dissolved.

720,747. MANUFACTURE OF CONCRETE BEAMS, GIRDERS, ETC., WITH IRON BARS INLAID, FOR BUILDING PURPOSES.—Hans Siegwart, Lucerne, Switzerland. A method of forming columns, which consists in forming a bed of plastic material with parallel cavities therein and cutting the bed of material into strips between the cavities.

720,774. ORE-CONCENTRATING TABLE LAUNDER.—John O. Bardill, Deslodge, Mo.—The combination with a concentrating table of a launder comprising a pair of trough-arms provided with mineral and tailings receiving conduits



and a middlings-receiving compartment, apertured shelves located in said trough-arms onto which a portion of the substance entering the launder may be conducted either into said middlings-compartment or passed therethrough into said conduits, and means for controlling the flow of the substance from said shelves.

720,749. DREDGING-MACHINE.—Conrad Sonderegger, Zurich, Switzerland. In a dredging-machine, the combina-

tion with a barge, of two independently-swinging frames mounted thereon, a continuous carrier mounted on one frame, mechanism for operating the carrier, a cutter mounted on the other swinging frame, mechanism for operating the cutter, and means for controlling the position of the carrier and cutter.

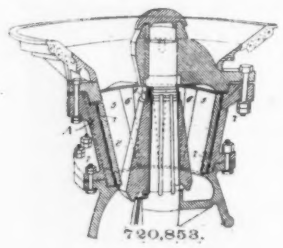
720,799. COMPOSITION FOR PLASTER FOR WALLS, CEILINGS, ETC.—Hiram M. Hanmore, Los Angeles, Cal. A composition for wall-plaster consisting of diatomaceous earth, calcic oxide, kaolin and fiber.

720,780. GAS-RETORT.—Julius Bueb, Dessau, Germany. Apparatus for making illuminating or heating gas, which consists of a furnace for heating the retort, a collecting-passage which is not in direct contact with the furnace, and a retort which is provided with a lateral slit or slits communicating with the collecting-passage.

720,781. CARRIAGE FOR TRACK-CABLES.—Charles A. Case, Trenton, N. J. In a carriage the combination of a frame, links journaled to the frame, a pin carried by the free ends of the links, an adjusting-link carried by the pin, and a grip connected up with the adjusting-link.

720,848. PROCESS OF PRODUCING ARTIFICIAL STONES.—Erich Schwanenberg, Hanover, Germany. A process for producing artificial stone for lithographic and other purposes, which consists in alternately treating the previously-compressed stone mass, consisting of the ingredients specified, with carbonic acid and fresh air, the latter at the ordinary temperature.

720,853. CONCAVE FOR ROCK CRUSHERS.—John D. Spargo and George W. Rose, Doble, Cal. The combination


720,853.

in a rock-crusher of a shell and separable concaved or grinding surfaces, said concaves or surfaces having parallel side edges and locking-keys between adjacent concaves and tapering from one end to the other.

720,872. GAS-COMPRESSOR.—Stephen E. Alley, Glasgow, Scotland. In a stage gas-compressor the combination of a differential trunk reciprocating piston, a cylinder containing it and divided by the piston into two compression-chambers, a crank-shaft operatively connected with that piston, an inlet-valve chest, an outlet-valve chest, both chests extending along one side of the cylinder, an intercooler comprising a series of connected gas-tight pipes, an inlet-conduit from a source of gas-supply to the inlet-valve chest and thence to one of the two said compression-chambers, an outlet-conduit from that chamber to the outlet-valve chest and thence to the intercooler, an inlet-conduit from the intercooler to the inlet-valve chest and thence to the other of said compression-chambers, an outlet-conduit from that other chamber to the outlet-valve chest, two piston sliding valves one in the inlet-valve chest and in the inlet-conduits of that chest and constituting a gas-tight partition between them and the other in the outlet-valve chest and the outlet-conduits of that chest and constituting a gas-tight partition between them, and two eccentrics on the crank-shaft one operatively connected to the inlet-valve and the other to the outlet-valve.

720,883. AMALGAMATOR.—Oscar H. Burden and Theodore F. Adams, Kalso, Canada. An amalgamator, comprising a sluiceway having an amalgam-reservoir, ore-attenuating mechanism situated in the sluiceway and having revoluble members of different sizes disposed in co-operative relation to each other, and means for driving the larger of said revoluble members at a peripheral speed exceeding the rate of flow of water and auriferous material through the sluiceway.

720,884. REGULATION OF ELECTRIC CIRCUITS.—Charles F. Burgess and Budd Frankenfield, Madison, Wis. The method of regulating an electric circuit, which consists in including, within the circuit, the resultant inductance due to alternating and direct magnetizations.

720,904. FURNACE FOR HEATING BILLETS.—Victor E. Edwards, Worcester, Mass., assignor to the Morgan Construction Company, Worcester, Mass. In a furnace, the combination with an inclosed chamber provided with an opening near one corner of said chamber for the admission of a billet, and an opening near the diagonally opposite corner for the delivery of a billet, of a series of rotating rolls inclosed within said chamber with their upper surfaces in a plane to support billets thereon and having their axes placed obliquely to the line of motion of a billet as it advances through said admission-opening.

720,905. FEEDING MECHANISM FOR BILLET-HEATING FURNACES.—Victor E. Edwards, Worcester, Mass., assignor to the Morgan Construction Company, Worcester, Mass. In a feeding mechanism for billet-heating furnaces, the combination of a series of rolls arranged to support a billet upon their upper surfaces, means for rotating said rolls, whereby a longitudinal movement is given to the billet, a longitudinal guide-plate by which a billet is held near one end of said rolls, means for transferring a billet by a sidewise movement toward the opposite ends of said rolls and a stop interposed in the path of a transferred billet by which its endwise movement is stopped.

720,909. MOUNTAIN ROPE-LIFT.—Wilhelm Feldmann, Elberfeld, Germany. A rope-lift or elevator provided with a double or duplex supporting-cable permanently secured at the upper station and yieldingly connected together at the lower station and to a counterweight in such manner that they are always maintained under constant tension.

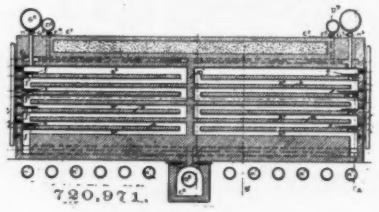
720,927. PROCESS OF PREPARING BARIUM HYDRATE. Charles B. Jacobs, East Orange, N. J., assignor, by mesne assignments, to the United Barium Company, Jersey City, N. J. A process of purifying barium hydrate crystals which consists in fusing the said crystals in their own water of crystallization, then treating with superheated steam.

720,960. AUTOMATIC ORE-LOADER.—Thomas M. Park, Darrington, Wash. The combination in a loading apparatus of a tiltable frame, a support therefor, sprocket-wheels turnable on axes vertical to the bottom of the trough in which the conveyor operates, an endless conveyor traveling about said sprockets, said conveyor having blades adapted to sweep up a load at the lower end of the frame and to discharge the load at the upper end thereof.

720,963. DUMP-GATE FOR ENDLESS TROUGH CARRIERS.—John Petersen, Chicago, Ill., assignor to the Link Belt Machinery Company, Chicago, Ill. The combination of a permanent track on which is supported one end of each carrier-section, with a second permanent track having movable sections on which the other end of each carrier-section is supported in varying positions at the will of the operator, both of said tracks being normally in substantially the same plane, and the movable track-sections being adapted to be moved longitudinally.

720,969. ORE-ROASTER.—Frank C. Roberts, Philadelphia, Pa. An ore-roasting furnace, consisting of two structures side by side separated by a space, each structure having a longitudinal series of roasting-chambers, means for supplying heat thereto and conveying the waste products therefrom, a railway in said space and along the outside of each structure and chutes provided with means controlling the discharge to cars on any of the tracks at will.

720,971. COKE-OVEN.—Matthew E. Rothberg, Lebanon, Pa. In adjacent open-end coking-ovens, a hollow longitudinal wall separating the oven-chambers, longitudinal deflecting-

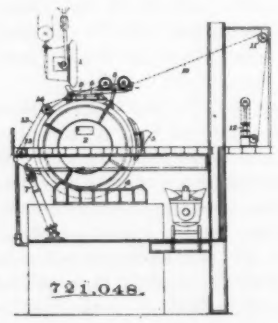

720,971.

partitions forming reverting combustion flues in the cavity or chamber of said wall, alternate partitions having openings therethrough forming short-circuiting passages connecting said flues, and provided with sliding valves, the oven-wall having an opening adjacent to each such valve, and plugs for closing such openings.

720,983. DREDGE.—Frank H. Stolp, Chicago, Ill., assignor to Frank K. Hoover, Kansas City, Mo., and Arthur J. Mason, Chicago, Ill. In a clam-shell dredge the combination with a two-part bucket, of closing-arms, means connecting the two parts of the bucket with the closing-arms, opening-arms pivotally connected to the closing-arms, and other means connecting the opening-arms with the two parts of the bucket in rear of the points of connection of the closing-arms therewith.

721,030. BRICK.—Joseph B. Dunlap, Tonkawa, Okla. A brick or building-block composed of sand as a base combined with a chemical binder of soluble silicate of soda, carbolic acid, alum and sulphate of copper.

721,048. MIXER FOR MOLTEN METAL.—Julian Kennedy, Pittsburg, Pa. A mixer for molten metal preparatory to further treatment, said mixer being of substantially spher-


721,048.

cal form and mounted to roll on its bottom, and substantially horizontal supports beneath the spherical body on which the mixer rests and on which it may be rolled, said mixer having a pouring-spout on its spherical body directed transversely to its axis of movement.

721,046. ROLLING-MILL APPLIANCE.—Julian Kennedy, Pittsburg, Pa., assignor to himself and Samuel T. Wellman, trustees, Cleveland, Ohio. The combination with a feed-table, of a longitudinal guide extending across the rollers and having a flat vertical face, mechanism for moving the guide across the table and over the rollers in substantially parallel lines, a manipulator arranged to tilt the metal against the guide in the different adjusted positions thereof, and mechanism for moving the manipulator transversely of the table.

721,047. ROLL-HOUSING SUPPORT.—Julian Kennedy, Pittsburg, Pa. The combination with a support, of a housing-foot having an inner shoulder bearing against the support, and clamping mechanism comprising a separate outer transverse shoe engaging the foot and support and having coacting inclined faces, and devices extending through the foot for securing the foot in place.

721,061. PROCESS OF MANUFACTURING STEEL.—Andrew F. Mitchell, Munhali, Pa. A process for toughening and hardening steel, consisting in subjecting the steel to a heat sufficent to raise the temperature thereof above recalescence, then cooling the steel to a temperature below recalescence without removal from the heating-furnace, again heating the steel to a temperature immediately below recalescence, and then again cooling the same.

721,075. PRESSURE-REGULATING DEVICE FOR COMPENSATORS OF DIRECT-ACTING PUMPS.—Philip F. Oddie, Oschersleben, near Magdeburg, Germany. In a pressure-regulating mechanism for direct-acting pumps, the combination with the steam and pump cylinders, pistons and piston-rod connecting the same; of a compensator-cylinder disposed at right angles to said cylinders, a piston therein, connecting means interposed between said piston-rod and compensator-piston, means for exerting a pressure behind said compensator-piston, and means operated by said compensator-piston for relieving said pressure when the stroke of said piston-rod exceeds certain limits.

721,088. FURNACE CHARGING, CONTROLLING, AND DISTRIBUTING MECHANISM.—Erskine Ramsay and John J. Shannon, Birmingham, Ala. In a charging structure for metallurgical furnaces, the combination with the charging-opening, of a plurality of distributing-valves each for directing material toward a different part of the charging-opening, and means for separately opening said valves away from the center.

721,091. PROCESS OF PRODUCING CARBONATES AND CHLORIDES.—George F. Rendall, New York, N. Y. A process of simultaneously producing carbonates and chlorides, which consists in the following steps in the order named: first in roasting lead ore whereby sponge is formed, next eliminating any excess of iron therefrom, next dissolving said sponge in a solution of hydrated acetic acid until it has become a basic solution, third, treating a carbonate with a solution of muriatic acid and water, thereby converting said carbonate into a chloride and evolving carbonic-acid gas, and lastly, utilizing this carbonic-acid gas by passing the latter through said lead solution.

721,092. PROCESS OF MAKING METAL OXIDES.—George F. Rendall, New York, N. Y. A process of making oxides, which consists first in placing the ore within the furnace, second excluding air from the contents of the furnace, next heating the walls of the furnace externally, next injecting liquid hydrocarbon and oxygen into the interior of the furnace thereby forming metallic oxides.

721,103. ORE OR COAL WASHER.—Newton A. Smith, Johnston City, Ill., assignor of one-half to Benjamin Perrine, Lake Creek, Ill. The combination of a water-containing tank, a pump disposed in said tank and adapted to maintain a continuous circulation of water therein, an inclined cylinder adapted to receive the material to be washed at one end and to discharge the same at the opposite end, a pump discharge-pipe leading into the lower end of the cylinder, and baffle-plates arranged in the tank at points between the opposite ends of the cylinder.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending January 29, 1903.

2,402 of 1902. ROASTING FURNACE.—G. Rambaldini, Bocchegrano, Italy. A roasting furnace for roasting finely ground copper pyrites, at a uniform temperature of 700° C so as to produce sulphate of copper, ferric oxide and sulphurous acid.

3391 of 1902. FUSE COVERING.—W. F. Bennett, Camborne. An improved method of wrapping on the waterproof covering of miners' safety fuses.

3,650 of 1902. IRON ORE BRIQUETTES.—K. Meyenburg and E. R. Butler, Zurich, Switzerland. Making briquettes of iron ore, cased in iron, so as to strengthen them without adding a harmful or glutinous binding material.

11,886 of 1902. DUST CATCHER.—J. E. C. Koch, London. Improved chambers for catching the dust of blast furnace gases and heating the blast for the furnace.

24,360 of 1902. SULPHATE OF COPPER MAKING.—A. Von Gernet, London. Improved plant for treating copper ores with sulphurous acid obtained by roasting pyrites, and so making sulphite of copper.

25,250 of 1902. DRILL.—J. L. Cook, Springfield, Illinois, U. S. A. Improved form of miners' drill head and bit.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. Ralph Nichols sailed on the *Lucania* on February 21.

Mr. Victor Clement left New York for Zacatecas, Mex., on February 19.

Mr. P. L. Kimberley, of the Western Exploration Company, has been in Salt Lake, Utah.

Mr. R. H. Terhune, of Denver, Colo., is at Portland, Ore., on professional business.

Mr. Alexander Burrell has returned to Marysville, Mont., after a visit to San Francisco, Cal.

Mr. H. R. Ayres, Salt Lake, Utah, manager for the Colorado Iron Works Company, is in Mexico.

Mr. A. H. Godbe, of Salt Lake, Utah, is in Idaho. Before returning he will examine mines in Pearl, Colo.

Mr. Ainslie Marshall, of Boston, Mass., and lately in West Australia, was in New York City on February 24.

Mr. W. M. Courtis, of Detroit, Mich., is at the Manhattan Hotel, New York City, for a couple of weeks.

Mr. J. H. Weddle, of Denver, is now with the New York & Honduras Rosario Mining Company, at San Juacinto, Honduras.

Mr. A. H. Ackermann, lately superintendent at the Tomboy Mine, Telluride, Colo., sailed for Europe on the *Cedric* February 25.

Mr. H. F. Polland, former manager of the Highland Boy mines, at Bingham, Utah, is managing a mining property at Poney, Mont.

Mr. Frank E. Pearce, manager of the Iron Dyke Mining Company, of Oregon, has just returned from a business trip to New York City.

Mr. Michael Shovelin is now in charge of the mines of the Bald Butte Mining Company as foreman, succeeding Mr. William Shovel, resigned.

Mr. Frank L. Sizer has accepted a position as consulting engineer for the Beatrice Mining and Milling Company, near Elleston, Mont. His headquarters will be at Helena.

Mr. J. H. Smith, of Little Falls, N. Y., has gone to Tubantora, Sonora, Mex., to visit the Sonora Milling and Mining Company's mines, of which he is the vice-president.

Mr. Robert R. Moffett, of Bayonne, N. J., general superintendent of the Orford Copper Company, has been visiting the principal lead and copper smelters of the West.

Mr. C. A. Hopkins, of Boston, Mass., one of the principal stockholders in the Quartette Mining Company, has been at Searchlight, Nevada, visiting the company's mines.

Mr. John Stevenson, Jr., now general superintendent of the Sharon Steel Company, at Sharon, Pa., will soon resign his position. He is preparing for an extensive trip abroad.

Mr. W. D. Gray, of Cudahy, Wis., president of the Holthoff Machinery Company, recently visited Sumpter, Ore., where he established a branch house with Mr. Albert Geiser in charge.

Mr. Thomas Taylor, who has been superintendent of the reduction department of the United Verde Copper Company at Jerome, Arizona, has been given charge of the smelter at Cananea, Mex.

Mr. A. B. Frenzel, of Denver, Colo., and Prof. W. P. Blake, of Tucson, Ariz., have returned to their homes after a tour of inspection of the molybdenite and vanadium deposits of Arizona.

Mr. Victor M. Braschi has been in New York City making his usual winter visits to the various manufacturing companies that he represents in Mexico City. Mr. Braschi returns to Mexico early in March.

Mr. Guy H. Waring, recently at Webb City, Mo., is now located at Galena, Ill., where he is in charge of the Grant Reduction Works, a zinc ore and concentration plant owned by Mr. Howard Chappell, of Chicago.

Mr. S. L. Perelman, of St. Petersburg, Russia, at one time agent there for the Gates Iron Works, has been in Salt Lake, Utah, for the purpose of investigating American methods of mining and ore reduction.

Mr. W. F. Kett, late London manager of the Allis-Chalmers Company, has been appointed manager of the new crushing machinery department of Hadfield's Steel Foundry Company, Limited, of Sheffield, England.

Mr. B. Crowell, of the firm of Crowell & Peck, Cleveland, O., has just returned from Canada, where he has been examining various mining properties, and is now on his way to Cuba to look after mining interests there.

Mr. W. A. Kelly, who for a number of years has been attached to the Gold and Silver Extraction Company as cyanide expert, has accepted the appointment as superintendent of the Hidden Fortune Mill at Deadwood, S. Dak.

Mr. W. B. Mucklow, of Hartford, Conn., of Chapman, Mucklow & Bosson, financial agents for the Majestic Copper Mining and Smelting Company, has been in Utah, accompanied by a large party of Eastern stockholders of the company.

Mr. George B. Earnshaw, of Salt Lake, Utah, accompanied by Mr. W. G. Nebeker, is in Old Mexico to examine and report in connection with the deal now pending for the sale of the Cerro Prieto gold mine in the State of Sonora.

Mr. William W. Keefer, of Danville, Ill., formerly general manager of the Himrod Coal Company has accepted the position of assistant general superintendent of the Pittsburg Coal Company, with headquarters at Pittsburg, Pa.

Dr. Franz Meyer, who was formerly manager of the Grillo Works at Oberhausen, Germany, has been appointed general manager and treasurer of the Wetherill Separating Company, and will have offices at 68 Broad Street, New York City.

Mr. F. R. Switzer has severed his connection with the purchasing department of the Pressed Steel Car Company, Pittsburg, Pa., to accept the position of assistant treasurer of the Salisbury Steel and Iron Company recently organized at Utica, N. Y.

Mr. C. P. Coleman, having resigned as purchasing agent of the Lehigh Valley Railroad, that office has been abolished and its duties will be performed by Mr. J. A. Middleton, second vice-president, with offices at 39 Cortlandt Street, New York City.

Mr. John Hays Hammond has completed arrangements whereby he will become manager and consulting engineer of the Guggenheim Exploration Company. Mr. Hammond will at once begin to develop several important mining properties controlled by the company.

Mr. D. G. Baird has been elected secretary of the Lehigh Valley Railroad Company in place of Mr. John R. Fanshawe, resigned, and Mr. E. A. Albright has been elected assistant secretary in place of Mr. E. Y. Hartshorne, resigned. The office of the assistant secretary will be at 26 Cortlandt Street, New York City.

Mr. Frank N. Gibbs, mining engineer, formerly of New York City, but for some time past in South Africa, is now visiting this country on professional business. Mr. Gibbs represents Mr. J. C. A. Henderson, of London and Johannesburg and the Delagoa Bay Development Corporation, Limited. He expects to remain in the United States about 2 months.

Mr. Paul Johnson, general manager of the British Columbia Copper Company's smelter at Greenwood, B. C., is, according to newspaper reports, about to retire from that position. He designed and had charge of the construction of the smelter, which since it began work in February, 1901, has made a remarkable record for tonnage handled and low costs.

Mr. R. J. Gross, second vice-president of the American Locomotive Company, has left San Francisco, Cal., for a trip around the world. He will visit Honolulu, Japan, Korea, Siam, China, Russia and every country of Europe to investigate the opportunities for business expansion in the Orient and in European countries, and to establish business relations in those countries.

Col. Henry G. Prout, for 16 years past editor-in-chief of the *Railroad Gazette*, has retired from that position to become vice-president of the Union Switch and Signal Company, one of the Westinghouse group of companies. Col. Prout is a civil engineer of wide experience, and has been also very successful as an editor in maintaining the high standard established in the *Railroad Gazette* by Messrs. Forney and Dunning.

Mr. J. D. Hurd, of Chicago, Ill., formerly connected with the Consolidated Coal Company, of Ohio, who has for the past 3 years been engaged in zinc mining in Southwestern Missouri, has been examining some coal properties in Central and Eastern Illinois during the past week, with an idea of again engaging actively in coal production. He is at present secretary of the Western Lake Shippers Bituminous Coal Association.

Mr. W. Reuben Russell, of Vandercook, Ill., who has just ended his third year as Illinois State president of the United Mine Workers of America, has been elected commissioner of the Danville District Coal Operators' Association, and assumes the office at once. Mr. Michael Kelley, president of the Kelleyville Coal Company in the Danville District, has appointed Mr. Russell as his personal representative at the coming State convention.

Dr. Frederick E. Wright, instructor in petrography at the Michigan College of Mines, has been appointed assistant State geologist of Michigan, and will have charge of the Houghton station of the State Geological Survey. Dr. Wright is a son of former State Geologist Charles E. Wright. He is a graduate of the University of Michigan and the University of Heidelberg, and was appointed instructor in the Mining College 2 years ago.

SOCIETIES AND TECHNICAL SCHOOLS.

ARIZONA SOCIETY OF CIVIL ENGINEERS.—At the recent meeting in Phoenix, Ariz., Prof. W. P. Blake, director of the Arizona School of Mines, and Prof. Locke, the inventor of the Locke hand-level, were elected honorary members. The next meeting is to be held in Tucson.

COLORADO COLLEGE.—Last December the trustees of this college in Colorado Springs, Colo., decided to start a department of engineering, comprising mining, electrical, civil and irrigation engineering. The plan is to offer next year the freshmen and sophomore studies, to add the junior subjects in 1904-'05, and the senior subjects in 1905-'06. A science building, now under construction at a cost of $270,000, will be completed next fall. A machine shop is also in process of erection. The equipment and the faculty will be increased from year to year in accordance with the above plans. Three works for the reduction of ore and large electrical plants are at Colorado Springs, and the mines of Cripple Creek are not far distant. Prof. Florian Cajori has been appointed dean of the new school of engineering. Dr. Cajori is known as the author of several works on mathematics.

INDUSTRIAL NOTES.

The Bullock Electric Company, of Cincinnati, O., has secured a motor contract from the Manaduta Mining Company, Japan.

The Holthoff Machinery Company, of Cudahy, Wis., has an Eastern sales department at room 407, 120 Liberty Street, New York City.

Borden & Selleck Company, Chicago, Ill., is furnishing the Milwaukee Western Fuel Company, with a number of 2 and 3 jacket revolving screens.

The American Locomotive Company has sent the Burt Manufacturing Company its fifth order for oil filters, to be used at the works at Schenectady, N. Y.

Milliken Brothers, of New York City, who recently secured some substantial South African and Mexican contracts, will erect a steel plant on the Staten Island flats, directly opposite Elizabeth, N. J.

The Kern River Power Company, of Los Angeles, Cal., has recently purchased from the Westinghouse Electric and Manufacturing Company 2 Type C compound-wound, 150-kw. generators, to be installed in its power house.

The A. Leschen & Sons Rope Company, makers of wire rope and aerial tramways has opened new offices at 920-922 North First Street, St. Louis, Mo. It will be glad to have mining men passing through St. Louis make the office their headquarters while in the city.

The Baldwin Locomotive Works, of Philadelphia, has recently completed 5 mogul locomotives for the Hokkaido Government Railway, of Japan; 2 consolidation engines for the Hokkaido Coal Mining and Railway Company, and one 18-wheel engine for the Sanyo Railroad, Japan.

The Yaqui Smelter and Refining Company, with headquarters at Hermosillo, Sonora, Mex., is about to let a contract for considerable equipment, including a 100-ton smelter, to be erected at San Antonio de la Huerta. The company is reported to be composed of Toledo, O., men.

The Lidgerwood Manufacturing Company, of New York City, has secured a contract for steam pile-driving equipment to be shipped to China. A contract for 4 cable picking-up machines has also been allotted the Lidgerwood Company by the United States Government for use in the Philippines.

At the recent annual meeting of stockholders of the National Lead Company, in Jersey City, N. J., the following directors were elected for a term of three years: A. P. Thompson, J. A. Stevens, R. R. Col-

gate, Walter Tufts. Mr. Tufts fills the vacancy caused by the death of Joseph L. McBirney.

The Clairton Ore and Coal Company, which will be a subsidiary company of the Crucible Steel Company of America, is to be incorporated under the laws of Pennsylvania on March 11. It will own and control the company's ore, coal and coking properties, including 2,500 acres of coal land in Fayette County, Pa., where a large number of coke ovens will be built.

The C. O. Bartlett & Snow Company, of Cleveland, O., has lately received orders for its special Common Sense conveyor for conveying clinker, capacity 1,750 bbls. per day, from the Bronson Portland Cement Company, Bronson, Mich., and from the Omega Portland Cement Company, Jonesville, Mich.; also an order for one of 1,000 bbls. capacity, from the Egyptian Portland Cement Company, Detroit, Mich.

The Struther-Wells Company, of Warren, Pa., has secured a contract for a penstock pipe 9 ft. in diameter and about 450 ft. long for Shawinigan Falls, Quebec. The pipe will be constructed of ⅜ and 7-16-in. steel, and will convey water under a head 90 ft. to turbine wheels. A portion of the power will be used at the falls, but the larger portion is to be carried to Montreal, approximately 90 miles distant, for lighting and power purposes.

The Mesta Machine Company, of Pittsburg, Pa., recently shipped from its works at West Homestead one of the largest reversing engines ever built. It weighs about 900,000 lbs. and consists of a pair of engines, each having cylinders 55 in. in diameter with 66-in. stroke. The crank shaft with balance wheel, put together in the shops of the Mesta Machine Company and shipped in one piece, weighed 140,000 lbs. This monster engine is to drive the 44-in. blooming mill of the Tennessee Coal and Iron Company, in the open hearth steel plant, at Birmingham, Ala.

The J. H. Montgomery Machinery Company reports recent sales as follows: Mex Cobra Mining Company, Chloride, Ariz.; Keystone Bank, of Keystone, S. D.; H. S. Merrill, of Gold Hill, Colo., and the Golden Banner Mining and Milling Company, of Custer, S. D., one each of the Company's Common Sense steel whims, with hoisting rope, buckets, cars, etc. It also outfitted the Colorado Springs Pressed and Fire Brick Company with belts, shafting, etc., and reports the prospects for next season bright. It is figuring on contracts for several large cyanide and concentrating mills.

At the recent meeting of the stockholders of the Union Iron Works, San Francisco, Cal., the following directors were elected: Henry T. Scott, Irving M. Scott, W. G. Dodd, P. N. Lilienthal, F. W. Zeile, Lewis Nixon, Max Pam. The directors elected as chairman of the board Henry T. Scott; president, W. G. Dodd; secretary and treasurer, Charles N. Champion. Henry T. Scott will continue as executive and financial head of the organization. Irving M. Scott will be elected the California director of the United States Shipbuilding Company. A naval architect and constructor will be vice-president.

Important contracts for machinery, among others, have recently been secured by Jos. T. Ryerson & Son, of Chicago, Ill., from the following concerns: Standard Oil Company, New York; Hendricks Manufacturing Company, Carbondale, Pa.; Bigelow Company, New Haven, Conn.; Rudolph J. Decker, Salt Lake City, Utah; Valk & Murdock Iron Works, Charleston, S. C.; Lectonia Boiler Company, Leetonia, O.; Holthoff Machinery Company, Cudahy, Wis.; Joliet Bridge and Iron Company, Joliet, Ill.; Perth Amboy Shipbuilding Company, Perth Amboy, N. J.; Maryland Steel Company, Sparrows Point, Md.; Continental Iron Works, New York; Norfolk & Western Railway Company, Kenova, W. Va.; Chicago Great Western Railway, Chicago.

Some of the numerous sales of engines made by the Allis Chalmers Company, of Chicago, Ill., during January include: St. Louis & Suburban Railway Company, St. Louis, Mo., 32 and 50 by 60 1890 cross compound Reynolds Corliss engine, 2 cylinders, 32 by 60 in.; Bethlehem Steel Company, South Bethlehem, Pa., 30 by 48 1890 horizontal Reynolds Corliss engine; Gunther Foundry, Machine and Supply Company, San Antonio, Texas, for Alamo Cement Works, 20 by 42 girder frame horizontal Reynolds Corliss engine, with boiler and heater; Georgia Iron and Coal Company, Chattanooga, Tenn., 44 and 84 by 60 long cross head blowing engine; Atlas Portland Cement Company, Northampton, Pa., 2 14 and 28 and 20 by 42 Reynolds Corliss air compressors; Penn Allen Portland Cement Company, Allentown, Pa., 20 and 40 by 42 Reynolds horizontal cross compound Corliss engine, 18 and 36 by 42 cross compound Reynolds Corliss engine, one 14 by 36 and one 12 by 30 1890 horizontal Reynolds Corliss engine.

TRADE CATALOGUES.

The H. W. Johns-Manville Company, of New York City, sends out a little circular showing the many asbestos and magnesia products of the company. These products include roofing and building materials, steam packings, fireproof cements, non-conducting coverings, asbestos fabrics, vulcabeston, molded mica insulation, etc.

Price-list No. 21, of the Phosphor-Bronze Smelting Company, of Philadelphia, Pa., sole makers of Elephant brand phosphor-bronze and other alloys gives prices of the metal in sheets, wires, rods, wire ropes, and also contains tables of weights of wire of different gauges. The company manufactures a variety of alloys for piston-rods, cylinder linings, valves or bolts and bearing metal for locomotives, marine and stationary engines.

The Lombard Governor Company, of Boston, Mass., issues Bulletin No. 100, describing an electric speed controller for use in connection with alternating current dynamos and Lombard governors. This device enables the governors to be controlled from some central station regulating the waterwheels and generators attached thereto so that a person in charge of the station can start, stop or alter the speed at will of any or all of the machines under his supervision.

The Christy Box-Car Loader Company, of Des Moines, Iowa, is sending out a little circular, calling attention to the increasing necessity of many mines shipping coal in box-cars, and the fact that loading coal into such cars by hand is a slow and expensive process, which curtails the output of the mine. The Christy loader is stated to be strong, simple and durable, and at a mine of medium capacity can save its cost in a few months of operation.

A special rope made of finest selected Manila stock is manufactured by the C. W. Hunt Company, of West New Brighton, N. Y. This rope is of two kinds. One for the transmission of power, spliced endless, is for running over large sheaves; the other for hoisting purposes, is for running over ordinary pulley blocks with sheaves 8 to 16 in. in diameter. A plumbago lubricant is used, reducing the internal friction of the fibers. It is known as the Stevedore brand.

The Arlington Manufacturing Company, of Canton, O., publishes a little pamphlet calling attention to the merits of Arlington compositions, for marine, tubular and water-tube boilers to prevent incrustations, scale, corrosion and pitting. Arlington compositions are stated to be vegetable extracts which convert the lime and magnesia and hold them in suspension as light precipitates that are blown or washed out of the boiler. The company offers to ship its compositions on trial, with the understanding of no pay if not satisfactory.

Catalogue F, issued by the Deming Company, of Salem, O., describes Deming power pumps for various services, including triplex power pumps, single or double acting, deep well pumping engines, etc. The pumps may be driven by steam, gas, gasoline or oil engines, by electric motors or by water power. Among the pumps described is a triplex electrically driven mine pump with outside packed and guided plungers, mounted on an iron truck. This pump is designed for 150-lb. working pressure, and is of handy design for use about coal or metal mines.

Circular No. 108, issued by the Allis-Chalmers Company, Chicago, Ill., describes the Klepetko & Evans improved McDougall roasting furnace. This furnace is a vertical iron cylinder, 15¾ ft. in diameter, lined with fire brick, containing 6 horizontal firebrick hearths 14½ ft. in diameter. Through the center of the furnace from top to bottom extends a hollow water cooled shaft, with water cooled arms, having removable and adjustable rabbles. The ore crushed to ¾ in. or finer is fed automatically to the topmost shelf, and by the rabbles fed to the shelves below. The furnace stands 40 ft. high, measured from the ground to the horizontal flue dust chamber. It is stated to require from 1½ to 2 h.p., and to have a capacity of from 35 to 50 tons per day, depending upon the sulphur contents and the grade of roasted product desired. Fifty-six of these furnaces are installed at the Anaconda Mining Company's works.

Ore and rock crushing machinery is described in the fourth edition of Catalogue A, an illustrated pamphlet of 62 pages, published by the Farrell Foundry and Machine Company, of which Earle C. Bacon, Havemeyer Building, New York City, is engineer. The catalogue illustrates and gives prices of Farrell crushers, Bacon's steel plate sizing screens, Bacon's direct-driven or geared crushing rolls, etc. The Farrell crushers range in size from a laboratory crusher with 3 by 1½ in. opening to an improved B style crusher with 36 by 24 in. opening, and a capacity of over 600 tons of rock in 10 hours broken to 3 in. cubes or less. In these crushers the main frames are made of a special strong mixture, and the pitman cheeks and toggle bearings of best open-hearth steel. The jaw plates are of chilled iron or special steel as desired. The Farrell-Bacon duplex crusher is a combination of two crushers in one frame designed for auxiliary crushing in connection with rolls. The largest size has an opening 60 by 15 in. The Farrell A crusher is of the Blake pattern, and is made in a large number of sizes. In connection with the crushers, rolls and screens, the manufacturers furnish all that is required for a complete ore-crushing or stone breaking plant including engines, boilers, shafting, pulleys, belting, etc., and complete plans for the entire work. Illustrations and diagrams of a number of such plants are given in the pamphlet.

Deadwood, S. D. Feb. 20.

(From Our Special Correspondent.)

The drop in Horeshoe is attracting much attention. Hardly a year ago the company was floated with a capitalization of $10,000,000, and stock offered to the public at par $1. Four millions was treasury stock, and the balance, it is understood, went to the promoters. According to a recent circular to the stockholders, the proceeds from the operation of the mines and the sale of treasury stock, went to pay for the purchase of the original Horseshoe property and considerable adjoining ground, as well as to convert the chlorination plant at Pluma into a cyanide mill, and to buy the smelter at Rapid City. The company also declared dividends amounting to about 6c. per share on the outstanding stock not pooled. There has been a change of management, and the new executive committee of the board of directors has shut down the smelter and the cyanide plant at Pluma, to develop the mines and finish the 500-ton cyanide mill nearly completed at Terry.

The monthly dividends have been passed and stock is being sold at 35c. The property is considered a good one, but apparently has been operated for stock-selling purposes. It will be some time before the stockholder who bought at par gets his money out.

The Homestake Extension stocks, Hidden Fortune, Oro Hondo and Columbus Consolidated have been but little affected, and hold up well to their local prices, which needless to say are less than those advertised by fiscal agents in the East. They all have good prospects, but have been floated at a pretty high valuation. Thus the Oro Hondo, with a shaft now several hundred feet deep, reported to be in ore much of the way, and with a large acreage on the strike of the Homestake, has been sold in New York at the rate of $5,000,000, while at latest quotations the Homestake, with ore blocked out for 20 years ahead, and millions invested in surface improvements, is worth only $14,000,000.

The smaller companies operating cyanide plants are giving good returns, and there are a number of companies which should come into the list of dividend payers within the next year.

When the Jupiter Mill starts in March the cement conglomerate ores will be contributing again to the gold output. These ores were worked extensively in the early days by amalgamation, and but a small portion of their assay value recovered. They are of interest as resembling the ores of the Rand in South Africa.

Denver. Feb. 20.

(From Our Special Correspondent.)

The 8-hour measure now pending before the Colorado Legislature is of great importance to mines, mills and smelters. One of the special necessities of the mining in Colorado to-day is the profitable handling of low-grade ores at a profit. Mines producing a considerable tonnage of comparatively high-grade ore, at a liberal margin of profit, are practically rare exceptions. Mr. Arthur E. Winslow, speaking for the Colorado Mine Operators' Association, before the Committee on Mines and Mining of the Colorado House of Representatives, recently said that many of the low-grade mines would have to close if the proposed 8-hour law went into effect, as it would compel smelters to raise prices and increase mining costs, with the result of throwing a large number of miners out of work; further, that the mines producing low-grade ore, as compared with others, employed the greater number of miners on account of the larger tonnage.

Bills are now pending before the Colorado Legislature providing that a tunnel and mining company may condemn, under the Eminent Domain Act, a right of way, but will have to file plats to be filed with the County Clerk; the owner is to have the right, at any reasonable time, to have his property surveyed. Provision is made that such a tunnel shall be a common carrier, and shall charge only reasonable prices. It is probable that the proposed provisions to facilitate the driving of mining tunnels will also be applied to the building of aerial wire tramways crossing the property of other owners.

It is reported that the United States Patent Office, Washington, will allow the claims of the Hack filter press cyanide process. The process is somewhat similar to that used in Western Australia on the Kalgoorlie sulpho-telluride ores, and has been tested at the Camp Bird Mine near Ouray. A company has been organized in Denver to exploit the process and manufacture the appliances.

The Colorado Springs Mining Stock Exchange now requires quarterly reports, in detail, from all the companies whose stocks are listed on the Exchange, giving capitalization of the company, amount of stock in treasury, amount of cash in treasury, debts, and a statement as to whether the property of the company is worked or not; if not, when work was dis-

continued; also the amount of salaries paid. These reports are kept on file at the Exchange, and can be seen by any shareholder during business hours. Some of these reports contain surprising revelations. A company paying $1,800 annually to a secretary and $1,000 to each of its directors is $49,000 in debt. Another company, $2,700 in debt, pays its manager $200 per month. A third, $6,000 in debt, with no treasury reserve, and not even working its property, is paying $50 per month to a secretary.

The officials of the Exchange are going over the reports and revising the listed stocks. Companies which failed to file the required reports on February 1 have been dropped from the list, and a new classification is being made, which will probably result in a "Mines" list, a list of "Active Stocks" and a list of "Inactive Stocks." No stock can now be listed until it has been registered with some responsible trust company or bank.

Los Angeles, Feb. 18.

(From Our Special Correspondent.)

George Kislingbury, of Los Angeles, and A. L. Holden, of Salt Lake, recently visited the Bully Hill Copper Mines in Shasta County.

E. A. Wilke arrived in San Francisco on February 8 to close an important mining deal on a large copper mine in Shasta County, now under expert examination.

Philip Bradley, consulting engineer, at the Sudbury, Canada, nickel mines, left San Francisco for the mines on February 10. He will make a detailed examination of the mines and submit his semi-annual report at the regular annual meeting.

Leo Von Rosenberg, of New York City, now in San Francisco, is suffering from an acute attack of nervous prostration.

Senator Stephen A. Dorsey, of Los Angeles, recently purchased the Railroad Mines, which adjoin the Gold Roads Mines in Mohave County, Ariz. The consideration is said to be $30,000. The values obtained by surface sampling and from the limited development done show ores of workable grade. Development promises well.

O. P. Posey, Jr., of Los Angeles, recently purchased the Carl Mine on Stockton Hill, near Kingman, Ariz.

The Carl vein is a small fissure in a large porphyry dike, which cuts the granite country. The surface ores are practically free milling, carrying 1 to 2 oz. gold per ton. Systematic development has started.

Charles Shannon, of the Shannon Copper Company, reports that 14 car-loads of ore from the Phelps-Dodge gold mines located in northern Sonora, arrived last week at Douglas. The value approximated $200 per ton. There is a rush of prospectors to the district, and a number of good ledges have been located. The mines are about 30 miles northwesterly from Nacosari, and about the same distance from the railroad.

Messrs. C. T. Howland and F. Werner, of Los Angeles, have bonded the Johnson group of gold mines near Victor, this State. Development is under way, and a 5-stamp mill is en route to the mines. The vein averages about 2 ft. wide, and carries about $20 per ton in gold per ton.

J. W. Gates, of Chicago, Ill., is now in Los Angeles, investigating the merits of a well-known gold mine.

The Barstow 40-stamp mill is running steadily on ores from the Bagdad Mines, near Ludlow. Over 9,000 tons treated from development work have yielded $25 per ton. The property will probably change ownership during the next 30 days. John B. Farish is reported watching the outcome of present negotiations.

San Francisco. Feb. 19.

(From Our Special Correspondent.)

The resumption of work at the Keswick smelters of the Mountain Copper Company has been the means of starting up the Texas and Central mines at Old Diggins, and dozens of other smaller quartz mines in Shasta County. During the shut-down of the smelters these mines were unable to sell any ore and had to quit work, thus throwing many men out of work. With the De Lamar smelters at Bully Hill also busy, quartz miners are supplying flux for both concerns.

District Attorney Woodworth and Special Agent Pryor of the General Land Office have been in Shasta County looking up damages to government timber in the vicinity of the Mountain Copper Company's smelter. It is probable that there will be an early and amicable adjustment of the trouble, as the company has met the demands of the government in a spirit of fairness. The special agent some time since recommended the dismissal of the suits for injunction. The company is perfectly willing to have the damages legally assessed, and pay for the timber destroyed.

It is understood that the Washington authorities will take no action on the forest reserve question in California before April, and in consequence the miners in 16 northern counties, who have protested against the proposed reserve, will have more time to obtain testimony. They will hold a general meeting on March 9, when the necessary data will be in hand. In Shasta County the proposed reserve would take from public domain about two-thirds of the area of the county.

A bill has been introduced in the Legislature abolishing the office of State Debris Commissioner, and transferring the duties of that office to the Commissioner of Public Works. The Commissioner was originally appointed to co-operate with the California Debris Commission, a government board, having authority under the Caminetti law to grant licenses to mine by hydraulic process in the drainage basins of the Sacramento and San Joaquin rivers. The office has been practically a sinecure of no benefit to the mining industry. It is probable that the bill will pass.

Some of the miners up country are complaining that while certain hydraulic mines were closed because the Commissioners decided the dams did not restrain the debris, these mines are now run by Chinese leasers. This is doubtless true. The trouble is to punish Chinamen and keep them from working. There was a time in California hydraulic mining when the jails of some counties were so full of Chinese breakers of the minng laws that the expense became so great the counties finally set them all free to get rid of them. It was found later that every one was paid for being in jail while others worked the claims, there being some sort of a joint stock company, and all members getting their share whether in jail or out.

The "salt trust" is getting rid of its surplus stock made in California by sending it in shipload lots to Japan and China.

The Sierra Buttes Mine, in Sierra County, where the miners struck because the woman cook gave them bad butter, etc., has started again, the cook promising to do better in future. The men were out 2 weeks.

Attachments have been placed on the property of the Copper King Mining Company, Limited, at Clovis, Fresno County, though the mine is still at work. Capt. C. Harvey, representing the London stockholders, is in San Francisco endeavoring to straighten affairs up for the principal owner, Frank Gardner, of London. This is the mine in which W. H. Daley figured largely. His extravagance startled people, and finally got the company into trouble. He was deposed, and is no longer in California. The bills will doubtless be paid, but it remains to be seen whether the mine pays as well as stockholders were led to expect. It has a smelter at Seal Bluff Landing on San Francisco Bay.

News comes from Alaska that several thousand men are stampeding from Dawson, Nome, Eagle, Circle and Rampart to the new diggings on the Tanana. The new district is known as Fairbanks, and 600 claims have already been taken up. Nothwithstanding the unusually severe weather, men still continue to go to the new camp.

Many mines in California are still temporarily idle, owing to the severe weather, which has blocked the roads and cut off water supply by freezing the streams. An unusual amount of water will be available the coming summer, and is expected to last far into the fall.

San Luis Potosi, Mex. Feb. 17.

(From Our Special Correspondent.)

At the Aguas Calientes plant of the American Smelting and Refining Company, a plan of systematic swindling by salting has been discovered that has been going on about 2 years, at a loss to the smelter as variously estimated, of between $100,000 and $200,000 Mexican. It seems that some two years ago one Joseph, or Francisco, Baker began shipping ore to the smelter from Tepazala, just above Aguas Calientes on a branch of the Mexican Central Railroad, which netted him about $500 a car. His shipments soon amounted to a car a week, and the grade kept improving, until the last settlement before the exposure gave $9,000 for the car. Such good ore interested some of the smelter people, who intended to denounce ground around the mine. Samples did not prove up, however, and then the ore at the smelter, when carefully resampled, did not check the sample on which payment was made. Baker was arrested, but his accomplice, who worked in the sampling mill, has not yet been apprehended. The same kind of scheme was tried at the San Luis Potosi Smelter about a year ago, but only a few lots got in before discovery.

At Chihuahua, State of Chihuahua, are the old Santa Eulalia mines, where the Chihuahua Mining and Milling Company, with S. J. Sullivan, of Leadville, Colo., as manager, is working with a corps of Leadville assistants. The company has its own railroad to the mines, but they are also reached by the Chihuahua & Pacific, of which C. L. Graves, formerly with the American National Bank, of Leadville, is general manager. This road runs west to San Andres and Minaca. At Chihuahua the Mexican Central is crossed by the Kansas City & Orient Railroad, which has its own mining department, with A. F. Nathan as manager, and has acquired many properties along its proposed line, extending as far as the Urique District, near the southwest border of the State. Five hours south on the Mexican Central is Jimenez, from which runs a branch to Parral, a 3 hours' ride. The railroad continues to Minas Nuevas, where is the Hidalgo Mining Company, to Santa Barbara, the location of the Tecolotes Mining Company and the Montezuma Lead Mining Company, a branch of the Compania Metalurgica Mexicana; and to Rosario, where stage connection is made with Guanacevi. South of Jemenez 46 miles is Escalon, from which the Mexican Northern runs over to Sierra Mojada. The Mexican Northern is one of the many enterprises of Mr. R. S. Towne, president of the Mexican Metallurgical Company, the company which operates practically all the properties in Sierra Mojada, except some holdings of the Guggenheim Exploration Company. At Bermejillo, 75 miles south from Escalon, is the little road of the Penoles Mining and Smelting Company (probably the largest company in the Republic) that runs to the smelter at Mapimi. The company also has a road running to the mines, and contemplates building a railroad from the smelter to the recently discovered coal fields at San Pedro del Gallo, State of Durango. Twenty-seven miles from Bermejillo is Torreon, the intersection of the Mexican Central and International railroads, a point that bids fair to be one of the smelting centers of the Republic.

The competition between smelters in Mexico should keep charges down to a reasonable basis. In addition to the American Smelting and Refining Company's plants at Monterey and Aguas Calientes, and the independent ones at Monterey, Torreon, San Luis Potosi, Viesca, where the Coahuila Mining and Smelting Company has started copper smelting, and Tezintlan, there are smelters building at Guayinas, Avino, Tepeyahualco, San Antonio de las Huertas and Saltillo, with concessions granted for others in the States of Jalisco, Durango, Zacatecas, Chihuahua and Hidalgo.

The market in mining stocks has been strong. For Penoles Mining Company, of Mapimi, at $1,000 par, $4,000 was bid, with no sellers. Monterey Iron and Steel, and Torreon Metallurgical, both at $100 par, were in great demand at $143 and $245, respectively. For both Dos Estrellas and Cinco Senores $260 was bid. La Union, Hacienda de la Luz and Hacienda de Guadalupe, all of Pachuca, were strong at $275, $280 and $300, respectively. Santa Maria de la Paz, Matehuala, was sought at $800.

London. Feb. 11.

(From Our Special Correspondent.)

A good deal of official literature has been published this week dealing with the present condition and future prospects of Rhodesia. First of all came Mr. Davey's reports on the copper properties belonging to the Northern Copper Company and the Rhodesia Copper Company, which I mentioned in these columns a year ago as being actively prospected in the northern district of Rhodesia. A day afterwards the long-expected report of Mr. J. F. Jones, secretary of the Chartered Company, giving an account of his impressions gained during his recent tour in Rhodesia in company with Mr. Beit and Dr. Jameson. Both of these reports are lengthy and detailed, and are naturally optimistic, but from the point of view of stock exchange requirements were disappointing, because they candidly state that it is impossible to expect any profit from the copper deposits for several years to come. It is not necessary to go into the details of these reports here, as they will be dealt with from a miner's point of view in another part of the JOURNAL. As far as the City view of mining is concerned, the only point of interest to speculators is whether there is any chance for engineering a rise in the value of the shares. The City has naturally decided, after reading these reports, that there is nothing to found a boom upon, so the Rhodesian market has once more sunk into the dumps.

There has been no event to affect the Transvaal markets. The old controversy goes on with regard to the future supply of labor, and the directors of the South African Gold Trust, at the meeting of shareholders this week, indicate that their opinion leans towards the importation of Chinese laborers. Some of the London papers in sympathy with this group, which is identical with the Consolidated Gold-fields of South Africa, have been singing the praises of the Chinaman as a workman, and stating that the reason he is excluded from labor in the United States and elsewhere is his superiority of abilty and character, and in other ways indulging in special pleading. The propositions put forward and the methods of handling shareholders that are characteristic of the Consolidated Gold-fields Company are not always quite acceptable to the shareholders, in spite of the great commercial success of the company, and I very much doubt whether the average shareholder, in his capacity as a British subject, indorses the proposed policy of the company with regard to the labor question.

Another item of interest in the African market is the flotation of the British Central Africa Company. This is not a mining venture, but it is of interest to business people in England, and the United States, as it is a project which will open up the central African lakes to trade of all sorts. For many years Mr. Eugene Sharrer has carried on a trading business on

the Shire River, which runs south from Lake Nyassa and joins the Zambesi not far from its mouth. This business has been acquired by the present company, and it will be greatly extended in many ways, chiefly by the building of a railway from the junction of the Shire and Zambesi rivers, through Blantyre, to Lake Nyassa, not following the Shire River. It is intended eventually to build a railway from the northern end of Nyassa to the southern end of Lake Tanganyika. The British Government is giving a large grant of land to the company as a consideration for the building of the railway. It should be mentioned that the company comes out under influential auspices, and it has on the board of trustees Sir H. H. Johnston, the well-known explorer and commissioner of the Central African Protectorate, and Mr. J. F. Jones, secretary of the British South Africa Company. It may be objected, as is usual in London companies, that the vendor is getting far too much for his business, for Mr. Sharrer gets no less than £500,000. His fleet of trading boats would fetch very little in the steamship market, so probably the chief asset taken over from him is good will.

The Belgian company, which has worked more or less in unison with the Consolidated Gold-fields of South Africa, has unfortunately got into a tight corner. This company, called the Belgian Mining Trust of South Africa, is registered in England, but its office is in Brussels. It was formed in 1895 to introduce South African shares into Belgium, and to speculate in all kinds of shares in a similar way to the English companies of this kind. The company has in its time done some good business, and its list of assets two years ago looked promising enough, but at the present time its holdings appear to be chiefly in shares that have depreciated in value and pay no dividend. A comparatively small proportion of its present assets have anything to do with South Africa. There are many West African shares, and shares in mining companies operating in China, Peru, Australia, Colorado, Spain, Siberia, Tunis, etc., so that its interests are extended and various. The company has also made losses on options on shares and similar operations. It is doubtful whether the company will be wound up or whether it will be reconstructed. The future policy is now under consideration. The directors themselves wish to issue new preference shares to enable the company to proceed, but the shareholders are not satisfied with the present directors, and want some sort of a change, if the business is to be continued.

The British Columbia mining market continues to receive a good deal of attention. Following on the publication of the Le Roi report, that for Le Roi No. 2 has appeared this week. During the year ended September 30 last a profit of £45,000 was made, out of which a dividend at the rate of 5 per cent has been paid. There is little new in the report, except that the Elmore oil concentration process is to be adopted experimentally to deal with 50 tons a day of the low-grade ore. The Ymir Gold Mines, Limited, announce that the reconstruction scheme has been carried through successfully, and £15,000 new capital has been called up, so that the contemplated developments will proceed.

The Ingersoll-Sergeant Drill Company, Limited, the English company that owns the business conducted in America, has just issued £250,000 in 5 per cent mortgage debenture stock. The object is to pay for the new property at Philipsburg, N. J., and to erect new works. The business and property of the company are excellent security, so it is hardly necessary to say that the whole of the issue has been taken up.

Auckland, N. Z. Jan. 21.

(From Our Special Correspondent.)

Hauraki Goldfield.—During 1902 the production was, roughly speaking about £750,000, a considerable increase over the 1901 output. More than two-thirds came from the Waihi Mine. Next come the Crown, Tairua Broken Hills, Waitekauri, Talisman, Kauri Freeholds and Komata Reefs. It can hardly be said that mining in this field advanced much, for though Waihi and Karangahake have increased their production, and the Tairua District has come into prominence through the consistently good returns of the Tairua Broken Hills Mine, the old established districts of Thames and Coromandel, especially the former, have distinctly retrograded, while Waitekauri and Opitonui are under a cloud, owing to the almost entire suspension of active work by the Waitekauri and Kauri Freeholds companies.

The feature of the year has been the final abandonment of dry crushing by the Waihi Company, and the installation of a wet crushing system with copper plate amalgamation for the richer ore and separation of the pulp from the tables into slimes, sands and concentrates. The medium ore is classified without being passed over copper plates. The slimes are agitated with cyanide solution, and then filter pressed. In the Union battery this treatment is adopted; agitating with cyanide solution, filter pressing, then breaking up the cakes, adding water or weak solution, reagitating for a short time, and again pressing. Sands are cyanided in filter vats in the usual way (double treatment), and the concentrates exported to Australia for smelting. It will be noticed that this system is based chiefly on Johannesburg practice, the main point of difference being in the employment of filter presses for slime treatment, following Westralian practice. Filter pressing, although costing more for labor, has been found preferable to any decantation method, on account of the smaller bulk of solution required, and the better extraction, 96 to 98 per cent of the values having been obtained at times.

The chief returns during December were: Waihi, £49,686 ($248,430) from 16,817 tons, and £28,880 ($144,400) from 10,823 tons (15 days' return); New Zealand Crown, £6,294 ($31,470) from 2,558 tons; Talisman, £6,084 ($30,420) from 2,780 tons; Tairua Broken Hills, £3,706 ($18,530) from 850 tons; Komata Reefs, £2,960 ($14,800) from 1,100 tons; Woodstock, £2,516 ($12,580) from 1,847 tons; Bunkers Hill, £1,910 ($9,550) from 13 tons of ore and 304 lbs. of specimen stone; Hauraki tributers, £2,046 ($10,230), mostly from specimen stone; May Queen Hauraki tributers, £1,558 ($7,790) from 242 tons of general ore and 80 lbs. of specimen stone; Royal Oak, £1,018 ($5,090) from 193 tons of general ore and 383 lbs. of specimen stone.

The last return from the Waihi Mine brings its total output for 1902 to £520,138, an increase of £58,933 over the 1901 output of £461,205. The total production of the mine to date is £2,501,469. Out of this sum over £1,000,000 have been paid in dividends, a result of which the management may well be proud.

The conversion of the Waihi battery from dry to wet crushing is completed, and the 90 stamps are again at work, after a stoppage of about 3 weeks. Dry-crushing treatment is therefore completely abandoned by the company, and its 3 batteries (the Victoria, of 200 stamps; the Waihi, of 90 stamps, and the Union, of 40 stamps) are now all worked as wet-crushing plants.

Sinking has been suspended for the present in the Waihi Company's No. 2 shaft at a depth of about 700 ft. The sinking pumps have been drawn, and the shaft allowed to fill to the level of the big pump. This will affect the outside companies considerably, as they all depend upon the Waihi Company to drain their ground, and will be unable to sink to the depth required to develop their properties until the big mine resumes sinking. It was suggested some time ago that these outside companies should combine for drainage purposes, and put down a large shaft in a central position with a pumping plant capable of draining the whole field. Without some such combination it seems certain that the development of the Waihi gold-field outside the area controlled by the Waihi Company will be retarded for years.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

(From Our Special Correspondent.)

Caballona.—This mine, near Douglas, is shipping 75 tons of ore a week.

Copper Queen Mining Company.—This company has let a contract for 1,000 ft. of 10-in. air pipe. The copper stack at Benson will be in operation by March 1.

Jones, Erickson & Davis.—This company, near Bisbee, claims to have opened a vein of ore assaying 20 per cent copper and $4 gold. It has a group of 6 claims.

Marquette & Arizona Mining Company.—This company, near Bisbee, is installing an engine and hoist on its group of 3 claims.

GILA COUNTY.

(From Our Special Correspondent.)

Arizona & Hancock Mining Company.—On this company's property at Mineral Creek, the shaft, now 250 ft. deep, will be sunk 200 ft. deeper.

Yo Tambien.—The new smelting plant at Globe is almost ready. An aerial tramway and 300 ft. of surface track are being built.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Greenwood.—M. Levy, of Signal, has returned from San Francisco, with machinery to develop this mine.

Mother Lode.—This mine, at Chloride, is sinking the double-compartment shaft.

Paymaster.—This mine, at Mineral Park, has been sold by Thomas McNeely to C. Hoffman, of Enterprise, Kan.

Queen Bee.—This mine, at Niggerhead, is working 15 men in the long tunnel in the old workings.

Tennessee.—This mine, at Chloride, has closed, discharging 40 miners and mill hands. The cause is not made public.

PIMA COUNTY.

(From Our Special Correspondent.)

California Mining Company.—J. B. Stetson, superintendent, at Greaterville, has 35 men at work running a 6-ft. ditch 5 miles long to the placer mines. Three miles of 24-in. pipe will be laid, and a reservoir constructed on the east side of the Santa Rita Mountains. He hopes to have water to the placer by May 1.

YAVAPAI COUNTY.

(From Our Special Correspondent.)

Uncle Sam Copper Company.—The shaft on this mine, in Black Rock District, is down 100 ft. A gasoline hoist will be installed, and sinking continued to 500 ft.

United Verde Copper Company.—The furnaces at Jerome are in operation, and 600 men at work.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Centennial.—This mine, which has been idle for over a year, is to start up shortly under Superintendent Goss.

Oneida.—At this mine, at Jackson, the shaft is now 2,190 ft. deep. The recent rains necessitate considerable extra pumping.

Spring Gulch.—At this mine at Electra, 12 miles from Leon, C. C. Ranlett and partners are cutting a tunnel, which they expect to finish in about 3 months.

Western Mining and Reduction Company.—It is said this company has quit work on the Plymouth dumps at Plymouth, having run out of material. For several years the company has been working over the dumps, using roller mills. The company is trying to secure the dump of the Pacific Mine.

CALAVERAS COUNTY.

Black Oak Gold Mining Company.—It is stated by agents of this company that the articles recently printed in the Angels *Record* accuse the company's representatives of making claims never made, and do the company injustice. Differences between the company, and its former vice-president and manager are said to be the cause of the statements. The company has 8 lode claims, embracing about 130 acres of ground, 2 miles from Angels and 1½ miles from Altaville. A limited amount of development has been done. The company is putting in a new hoist and boiler, and has let a contract for 200 ft. of development. The company is capitalized at $1,000,000, and has its home office in San Francisco. The officers are J. J. Meyers, president; E. P. Lynch, vice-president; I. N. Rosekrans, treasurer; G. P. Adams, secretary.

(From Our Special Correspondent.)

Copper King.—Attachments amounting to $14,478 have been put on this mine at Clovis. The attachments are on the company's property at Clovis, not on the mine proper or the smelter. The matter will doubtless be quickly settled, as the company has a large investment.

Hammon & Carnduff Company.—It is stated that the prospecting tests on the ground near Jenny Lind have been satisfactory, and that this company will soon begin dredging on a large scale. Contracts for a dredger will shortly be let. The ground lies along the Calaveras River.

Nelson.—These gravel mines at Calaveritas, under superintendence of John J. McSorley, of Mokelumne Hill, are yielding gravel running as high as $1.25 per cubic yard.

Penn Mining Company.—This company, at Campo Seco, is having a new hoist built, with a capacity of 200 ft.

Werle.—The gravel mine, owned by Charles Werle, at Mokelumne Hill, has been bonded to Don Reardon, of San Francisco, for $30,000. The mine has paid quite well recently.

Wild Goose.—A new shaft is being sunk on this mine at Douglas Flat, to reach the deep channel bedrock. Pumps are being installed. The deeper part of the channel has never been worked on account of water.

INYO COUNTY.

(From Our Special Correspondent.)

Radcliff Consolidated.—Negotiations are reported pending relative for a sale of the mines at Ballarat, W. W. Godsmark superintendent. The property is owned by Michigan men, and consists of 12 claims.

KERN COUNTY.

(From Our Special Correspondent.)

Gray Eagle.—It is reported that E. T. Sweetser and R. C. Troegen, of San Francisco, have been offered a good cash price for this mine at Mohave.

Home Mining Company.—This company, of Long Tom, is owned by Oregon men, who have machinery for a 10-stamp mill on the ground. Some of the ore taken out is very rich.

Wedge.—This mine, owned by the Consolidated Mines Company, at Randsburg, has a fine streak of rich rock on one of its lower levels.

LOS ANGELES COUNTY.

(*From Our Special Correspondent.*)

Attempts are being made to develop the placers in Antelope Valley, 14 miles from Lancaster. Some machinery is being placed on the El Dorado and Last Chance claims, practically the only ones being developed. This district is in the Mohave section in the desert region. The gravel is to be worked in a Huntington mill after screening off the coarse material.

MADERA COUNTY.

(*From Our Special Correspondent.*)

Mountain King.—This iron mine, 5 miles southeast of Mariposa, is owned by Charles Schlageter & Co. Some high-grade ore is found.

Texas Flat.—Considerable machinery is being hauled in for this mine at Coarse Gold. A new electric light plant will shortly be installed.

MONO COUNTY.

(*From Our Special Correspondent.*)

Southern Consolidated.—This mine at Bodie has closed temporarily. A large amount of ore has been uncovered.

NEVADA COUNTY.

(*From Our Special Correspondent.*)

Orleans.—This mine, at Grass Valley, C. A. Brockington, superintendent, has had a clean-up netting $55 per ton. The ore was taken out by tributers.

Sierra Queen Mining Company.—This company, of Nevada City, W. H. Martin superintendent, has elected the following officers: S. W. Marsh, president; E. J. Rector, vice-president; E. L. Miller, secretary; Nevada County Bank, treasurer; David Muir and E. T. R. Powell. Ten stamps are running and 26 men are employed.

Union Hill.—The new mill of this mine at Grass Valley is completed. E. C. Crellar is superintendent.

PLUMAS COUNTY.

(*From Our Special Correspondent.*)

Cataract Gold Mining and Power Company.—This company, operating the Indian Bar Consolidated Mine on the North Fork of Feather, below Rich Bar, has put in a hydraulic elevator, which easily handles all boulders that pass through the 12-in. throat of the elevator. After the pit is dug giants will be used for washing the gravel. Other properties will be worked. The company owns 10 miles of the river channel along the canyon of Yellow Creek to the North Fork.

E. E. Mitchell.—This drift mine in Genesee Valley is now owned by C. H. Miller, of Minneapolis. A tunnel is being driven to tap the channel at greater depth.

New York.—At this mine, at Greenville, 10 more stamps are being installed and concentrators are being put in.

Phoenix.—At this mine, near Greenville, improvements are being made which will increase the crushing capacity.

SAN DIEGO COUNTY.

(*From Our Special Correspondent.*)

Julian Smelter.—After the people building the new smelter at Julian started work a flaw in the title to some ground was discovered. After this was straightened out, Dr. Stradley, the principal promoter of the scheme, was killed in a runaway accident, so the whole matter is again tied up until probate matters can be settled.

SHASTA COUNTY.

(*From Our Special Correspondent.*)

American.—At this mine at French Gulch a long tramway from mine to mill is to be constructed.

Central.—A 3-ft. ledge of good ore has been struck in this mine in Old Diggings District in the new tunnel being run by Superintendent A. A. Anthony. It was tapped 300 ft. from surface. This mine has been a producer for 15 years.

Hazel Gold Mining Company.—Electric power has been turned on for the plant of this company, owning the Gladstone Mine, in French Gulch. There is a 20-stamp mill at the mine, and 70 men are busy.

James J. Chambers Company.—This company, of Redding, has acquired the Mabel, Emma and Vulcan groups of mines at Mule Mountain. It is understood that the property will be turned in to the Great Divide Gold Company, which is doing considerable work at Mule Mountain.

TRINITY COUNTY.

(*From Our Special Correspondent.*)

A. Mansfield is carrying on drifting operations under the old abandoned mining town of Canyon City at Canyon Creek, not far from Weaversville, and is finding coarse gold in paying quantities.

Brown Bear.—In the Joker ledge of this mine at Deadwood, the seam has widened from 1 ft. to over 2 ft. In the China tunnel is a good ledge of ore 5 ft. wide.

Maple Creek.—D. C. Dedrick is doing well with his lease on the Maple Creek Mine, above Junction City. The mill has a capacity of 5 tons daily.

Yellowstone.—George H. Gill, of New Jersey, has a bond on this mine on the North Fork of Trinity River, and is forming a company to work it on a large scale.

TUOLUMNE COUNTY.

(*From Our Special Correspondent.*)

Altadena.—The new pump, installed by Charles A. Holland, is fast lowering the water.

Horseshoe Bend Company.—This company is treating with the Doyle Brothers for their holdings at Horseshoe Bend.

Mountain King Company.—This company, working the Hiatt Mine near Confidence, is about to put in a small mill to test the ores.

Sierra.—This mine, near Groveland, has its double-compartment shaft down 110 ft., with 10 ft. of ore at the bottom.

COLORADO.

CLEAR CREEK COUNTY.

(*From Our Special Correspondent.*)

Miners' Strike.—The miners at several properties near Idaho Springs have been called out in sympathy with the men employed on the Sun & Moon, where 150 men are out. In some cases the managers agreed upon 8 hours and a minimum of $2.75 per day, and the men returned to work. This is claimed to have been a violation of the agreement made between the various managers. It is not expected that the strike will spread further to the upper end of the county, or over into Gilpin County, where the minimum remains at $2.50 per day. Because of probable unfavorable legislation the strikers are demanding an 8-hour day, and an advance of 25c. per day for all classes of labor. Men employed in the mills are not affected.

Golden Smelter.—This plant is closed for a few weeks to make a clean-up and repair the machinery.

Occidental Development Company.—This company has surrendered its lease and option on the Harrisburg Mine at Idaho Springs, but will continue to work the Fraction Mine, which it bought outright in December. It is building a 4-mile track to connect with the Denver & Rio Grande in southern Colorado to reach its coal mines.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

McFarlane & Co., of Central City and Black Hawk, Colo., have shipped to the Alta Mines Company at San Miguel County, Colo., 8 Gilpin County bumping tables and other mill supplies.

Cripple Creek Gold Temple Company.—This company, in which Cripple Creek men are interested, has a lease and bond on the Aurora property in Russell District, formerly operated by the Cuba Gold Mining Company. The main shaft is down 400 ft., and the machinery is being overhauled. The lessees may decide to sink. Some high-grade smelting ores have been taken out of the mine.

Notaway Mining Company.—A certificate of full paid stock has been recorded, showing the capital stock to be $1,500,000, with C. S. Hazelwood, Chas. Davidson, C. Hoscheit, James Edwards and George R. Wright, all of Chicago, constituting the majority of the board of directors. The company owns and operates the Notaway property in Russell District.

Orado Gold Mining Company.—Chicago and associated Massachusetts men have started work on a group of claims in Eureka District, known as the Carrie G., and Carrie G. Extension, Hydrant claim and Hydrant mill site. The main shaft is 700 ft. deep, and development is to be carried on in the 400 level at first. There is scarcely any work done for the lower 300 ft. of the shaft, which ground will be opened after a while. The net values of smelting ores shipped has been over $50 per ton, the milling ores going $8 per ton net, while the concentrates gave net values of $15 per ton. L. H. Stockbridge, of Bradford, Mass., is interested.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Leadville Zinc Production.—Two hundred tons a day of zinc ore are shipped; about 100 tons coming from the 1,000-ft. level of the R. A. M. property of the Small Hopes combination. The United States Zinc Company is also shipping heavily from the Moyer dump.

Bon Air.—The Schlessinger lease is shipping the 60 tons of iron daily, and prospecting new ground. Small quantities of very fine chlorides have been opened.

Catalpa-Crescent.—Lessees are shipping from the Discovery shaft 30 tons daily of a good lead, oxidized iron and manganese ore.

Cloud City Mining Company.—The new company will take over the entire property of the old Cloud City Mining Company, downtown. With this done work is to be resumed at once and the shaft now down 500 ft. will be sunk deeper. The company when first organized paid out over $200,000 for mineral rights which it now owns.

Diamond Gold Mines Company.—This Philadelphia concern has been working 4 years on the Diamond property. Manager Brooks states that the recent find in a 200-ft. drift at 1,020 ft. depth, is proving to be the extension of the oxidized shoot of the Resurrection, and averages well in gold. The ore has been followed 75 ft. The first shipment just made was 75 tons. Assays showed values running from too low to ship to $50 a ton. Manager Brooks is placing an order for a new hoist and other large machinery.

Dolly B.—A. J. Andrews, one of the owners, has arrived from Montreal and will have charge of the financial end of the proposition. Old drifts and the shaft are being cleaned out. Large deposits of low-grade ore that can now be shipped at a profit as water is not so troublesome as formerly.

Hope.—Dennis Sullivan, of Denver, owner of this property, has leased it to Ed. Limberg and Martin Kelly. Work will start at the 200-ft. level, where oxidized ore running well in lead is exposed. The 380-ft. shaft is located in the city.

La Belle Mining Company.—This company, since resuming, is shipping some siliceous ore and pushing prospecting on Black Prince ground.

Midas-Coronado Combination.—Shipments of 200 tons daily continue from the Midas, while at the Coronado, the machinery is being overhauled and the shaft retimbered preparatory to resuming development and shipments.

Pacific Company.—The new shaft is going down rapidly. On the Tunnel claim nearby a fine vein of quartz and iron showing a red iron oxide that will pan free gold has been opened at 175 ft. depth.

Peggy McCullom.—This fraction adjoining the Ballard on Breece Hill is operated by lessees, who are shipping a few tons daily of fair grade material.

Progressive Mining Company.—The main shaft where the strike was made, the Cady, has sunk 50 ft. A new shaft is also being sunk.

Sixth Street.—This property has not been bought yet by the Midas-Coronado syndicate, and is being worked by lessees headed by Charles Osgood, who are shipping steadily fair grade iron ore.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Cripple Creek Drainage Tunnel.—Work is progressing favorably from several headings. The length of the tunnel will be a little over 4,000 ft. and the time estimated to complete it to the El Paso shaft is 7 months. It will probably be driven within that time. The El Paso Company has the contract.

Free Coinage Gold Mining Company.—Work is again in progress on this property. The main workings are under lease to Shell, Neville and associates. The property is controlled principally by the estate of the late Sam Strong. Since January 1 a number of new leases have been let and the property is worked again.

Gold Coin Mining and Leasing Company.—The output is about 60 tons of ore per day, from the 5th, 6th, 8th, 9th and 10th levels. Part of this ore is coming from the Dorothy vein and the rest from the main vein. It is also understood that the management will lease the southern portion of the Gold Coin claim near the surface. The property is situated in the town of Victor and is controlled by the Woods Investment Company. F. M. Woods is general manager.

Londonderry.—Quite a little work is being done preparing for the lawsuit with the Wild Horse. The controversy is over extralateral rights, each side claiming the apex of the vein from which some of the ore in the Wild Horse is taken. A receiver appointed by the court looks after the ore in controversy and the expense of taking it out, etc. This suit bids fair to be an important one.

Wild Horse.—This mine, owned by the United Mines Company is shipping about 50 tons of ore per day of the value of from $30 to $40 per ton. The main shaft has been sunk to 1,120 ft., though sinking has been somewhat delayed on account of gas in the bottom of the shaft. Work is pushed on the 1,100-ft. level, and it is understood that the ore-shoot cannot be far off.

GEORGIA.

DADE COUNTY.

(*From Our Special Correspondent.*)

Georgia Iron and Coal Company.—A 200-ton furnace at Rising Fawn is in blast, after an idleness of several years. Joel Hurt, of Atlanta, is president of the company. The ore and coke come from the properties of the company near the furnace.

FANNIN COUNTY.

(*From Our Special Correspondent.*)

Lot 20.—This copper property, formerly owned by the Latimer estate, was recently sold to J. T. Howe, of Wisconsin, who will at once begin development. It was worked before the Civil War.

LINCOLN COUNTY.

(*From Our Special Correspondent.*)

Paschal.—This gold mine recently changed hands, and is now under the management of F. H. Hyatt, of Columbia, S. C. Extensive developments are contemplated.

Seminole Gold and Copper Company.—A smelter consisting of a reverberatory furnace and 2 roasters is in operation. An air compressor, for working drills, and a jig for separating the lead sulphide, etc., have been added to the plant.

LUMPKIN COUNTY.

(*From Our Special Correspondent.*)

Etowah Gold Mining and Milling Company.—This company recently incorporated, will organize in a few days, with ex-Governor Allen D. Candler, of Georgia, president. The work of installing machinery, building dams, etc., will be begun at once, and mining operations on a large scale will soon be under way. The company owns 16 claims on the celebrated Pigeon Roost belt, near Dahlonega.

IDAHO.

IDAHO COUNTY.

Galena Creek Gold Mining Company.—This company, of Paterson, N. J., has 4 claims on Little Seigel Creek. On the Kinne claim a tunnel is reported in 200 ft. On the Kinsilla a tunnel is in 300 ft., and a shaft, equipped with a steam hoist, has been sunk 200 ft. The company has also a 5-stamp mill on the ground. O. P. Kinsilla, of Paterson, N. J., is president of the Company.

Gentle Annie.—It is reported that final payment of $15,000 has been made on this property in Gambrinus District, near Idaho City, by Vivian A. Thorne, representing English purchasers.

Seigel Creek Mining Company.—This company, of Hackensack, N. J., has 2 claims immediately north of the Galena Creek Company's ground, and is developing them. George C. Glatz is president of the company.

ILLINOIS.

(*From Our Special Correspondent.*)

Illinois District of the United Mine Workers.—This body, which has been holding its annual convention at Springfield, this week meets the Illinois Coal Operators' Association in joint annual convention for the making of a scale and agreement for the year beginning April 1, to settle all questions left open by the national convention recently held at Indianapolis.

SANGAMON COUNTY.

(*From Our Special Correspondent.*)

Sangamon Coal Company.—This company's top work, northeast of Springfield, burned to the ground on February 21. The fire started in the blacksmith shop. Frank R. Fisher, secretary and general manager, states that the company will rebuild at once.

INDIANA.

(*From Our Special Correspondent.*)

Coal Properties Statistics.—J. L. Peetz, of Tipton, and H. M. Sough, of Indianapolis, appointed by the United States Census Bureau, are now gathering information about coal properties in this State. The penalty for the operator who refuses to give the desired information or makes a false report is a $10,000 fine, to which a year's imprisonment may be added.

PUTNAM COUNTY.

(*From Our Special Correspondent.*)

A 4-ft. vein of coal is reported discovered in Clinton Township, a few miles south of Green Castle. Drillers are now at work, and a contract has been let to mine. M. R. Dunn, the contractor, will begin work at once.

SULLIVAN COUNTY.

(*From Our Special Correspondent.*)

Chicago men have bought 1,225 acres of coal land in Curry Township, and will develop it by sinking a number of shafts.

GREENE COUNTY.

(*From Our Special Correspondent.*)

Island Valley Coal Mining Company.—This company, of Linton, has increased its capital stock from $10,000 to $40,000, and will sink 2 more shafts.

MICHIGAN.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Agate Harbor.—This property, 10 miles east of Eagle Harbor, has been sold by John H. Gatiss to Chicago parties. It never produced much copper. William Gatiss is in charge, and work will begin next summer.

Quincy.—An order for 30 Hodge improved jigs has been placed with the Hodge Iron Company, of Houghton, Mich. The jigs will be installed at the stamp mills at Mason, where 62 are already in use.

Phoenix Consolidated.—At this mine the St. Clair shaft is down 1,450 ft., and the shaft on the West vein is 600 ft. deep. Twelve power drills are in use, 6 in each shaft.

Resolute.—This company has raised $1,000 by calling a $1 per share assessment. The mine adjoins the Delaware on the east. Work may be resumed next summer.

St. Mary's Mineral Land Company.—This company has discontinued diamond drill work on section 12, south of the Globe property.

Winona.—The site of No. 3 shaft has been surveyed. It is 1,650 ft. south of No. 2 shaft, and sinking will start in the spring.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—Repairs to the first head and equipment at the new mill have been completed. A force of machinists is at work on the second head.

IRON—MARQUETTE RANGE.

Chapin.—The new 12th level of this mine at Iron Mountain, now being opened on an extensive scale, is to be provided with an electric haulage system. A chain haulage is now in use on the 10th level, with satisfactory results. The Chapin will be the first mine on the range to be equipped with an electric haulage. The Lake Angeline Mine at Ishpeming and the Norrie Mine at Ironwood, as well as the Quincy Copper Mine, are now the only Michigan mines provided with such plants. In opening the new level arrangements will be made for stations and sidings so that the locomotives can be kept in constant operation. The plans provide for hoisting all ores from the level. The ore in the 10, 12½ and 11 levels will run through chutes to the 12th level, and all the ore mined on the 4 levels will thus be brought within reach of the electric system. The General Electric Company, of Schenectady, N. Y., has the contract for the motors and the power will be generated at the company's hydraulic works. The system will be installed as soon as possible.

IRON—MENOMINEE RANGE.

Buffalo & Susquehanna Iron Company.—This company of Buffalo, N. Y., has purchased a lease on property near Iron Mountain, including the 40 on which the Shaw syndicate has done some exploring. It was purchased to supply various blast furnaces operated by Rogers, Brown & Co. with siliceous ore.

Forest.—At this mine of the Oliver Iron Company a body of high-grade bessemer ore is reported cut in one of the drifts to a depth of over 25 ft., and the men are still drifting in the ore. It gives promise of being a considerable deposit.

MINNESOTA.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

Biwabik Mining Company.—This company is stripping with 3 large shovels and 200 men, and will carry on work nearly all winter. It has suffered little inconvenience from frost. The stripping is on the north side the great pit, to the north line of the mine and the ore-body. Some changes are also being made in the through-cut to the east side of the mine. The mine will probably produce more ore the coming season than the 623,000 tons of 1902.

Boulder Iron Company.—This company has found a little ore in the n. e. ¼ of the n. e. ¼ of section 28, T. 59, R. 14, where it has been working some weeks. The ore has been known for some years, and is quite thin. It is possible that deeper exploration may find it in larger quantity. The same company is working near Biwabik, and is 24 ft. in good ore in one hole, with one other on the ore.

Cascade Iron Company.—This company controls most of the s. e. of the s. w. of section 13, T. 58, R. 22, and will explore. Croxton explorations there have shown barren taconite.

Gates Iron Company.—This company controls the n. ½ of the s. w. ¼ of section 13, T. 58, R. 22. Explorations there some time ago showed nothing but quartzite.

Lackawanna Iron Company.—A. M. Miller, Jr., is exploring the State lease in section 24, T. 57, R. 22, owned by this company, and has an option to purchase the lease within the coming 9 months at $100,000.

Pickands, Mather & Co.—This firm's mines are working heavily, and will have a large amount of ore in stock at the opening of navigation. The Elba-Corsica groupt now has 150,000 tons on surface. Their output last year was 265,000 tons. The Troy, which was not a shipper last year, is now stocking fast, and will be quite a shipper this season. The Albany is not being opened yet, but will probably be ready to ship in 1904. The Utica is stocking fast, most of the ore coming from development. This mine made a first shipment of 9,000 tons last fall. Malta and Sparta, the company's largest Mesabi producers, are preparing for a very active year, and will considerably improve on their 380,000 tons of last year. Most of the firm's old range producers are very busy also. Shipments the coming year will be largely to the new furnaces of the Buffalo Steel Company, at Buffalo.

Shenango Furnace Company.—This company, headed by W. P. Snyder and H. W. Oliver, has just bought a number of State leases from A. Maitland and H. W. Parmalee. One of the s. e. leases is the n. w. ¼ of the n. w. ¼ of section 21, T. 58, R. 19, on which there is a good deposit of ore. The others are not known to be as valuable. Explorations will proceed on some continuously. The company is also back of the Standard Mining Company, which has an option on the old and oft-rejected Arcturus property, in Itasca County, and is exploring there this winter. This option is for a lease at low royalty. Messrs. Snyder and Oliver are interested also in the properties of which C. A. Congdon, of Duluth, is the head, which contain a vast quantity of excellent ore. These form in all, possibly, the largest group of independent ore reserves in one control on the Mesabi, and are of great value. The Shenango Mine in section 27, T. 58, R. 20, is developing finely and stocking ore, and will make a large output this year. The St. Clair having an ore easy to flux, is operated under a contract by the Minnesota Iron Company, is developing well and will be a considerable shipper.

Spruce.—A fire in No. 3 shaft last week imprisoned 12 men, 2 of whom were brought out dead. The lower levels were flooded, but the mine will be operating all workings again in a few days. Some exploration has been carried up toward the village of Eveleth, causing rumors that the village might have to move a second time. The ore does not, however, extend to the village and is no new find.

LAKE COUNTY.

(*From Our Special Correspondent.*)

There is considerable excitement among Duluth residents, not mining men, over what is claimed to be a valuable find of iron ore along the crest of the ridge about 10 miles back from the lake, and more than 100 State leases were taken out last week for lands supposed to be within the belt of the formation. The prediction is freely made in some of the local papers that another Mesabi is to be found there. The fact is that so long ago as 1882 the first surveying party on the Duluth & Iron Range road found marked magnetic disturbances in that vicinity, and looked the matter up. They found nothing. There is probably some magnetite in the basaltic rocks(but the ore is float boulders of ore or jasper brought down from the north, and a glacial wash of soft ore from the Mesabi. It will be exceedingly surprising if anything more valuable than these indications exist. Now, with 3 ft. of snow over the entire region, leases are being taken in quantity for miles. These leases, however, cost only $25 apiece, and cover 160 acres each.

MISSOURI.

JASPER COUNTY.

(*From Our Special Correspondent.*)

Chicago Zinc Mining Company.—This company has purchased the Yankee Boy property at Aurora, and Hays City, H. W. Randall and Sig. Burton have purchased this property at Aurora.

Primrose.—This prospect shaft on heretofore undeveloped land at Duenweg, has encountered 40 ft. of zinc ore at from 86 to 126 ft. in sinking.

MONTANA.

LEWIS & CLARKE COUNTY.

(*From Our Special Correspondent.*)

Gloster.—J. Henry Longmaid & Bro., of Helena, have secured this old property, situated at Gloster, 2 miles from Marysville, which 20 years ago was considered one of the big gold mines of the State. The ore was put through a Boss continuous process mill, but at a depth of 600 ft. the character of the ore necessitated a change of treatment, and the property was closed down.

MADISON COUNTY.

(*From Our Special Correspondent.*)

Hudson Mining Company.—C. L. Dalher, of Helena, M. S. Largey and Robert McBride, of Butte, are the incorporators. The property is at Iron Rod. The capital stock is placed at $150,000 in $100 shares.

PARK COUNTY.

(*From Our Special Correspondent.*)

Bear Gulch Gold Mining Company.—From H. D. Andrews, who has superintended these properties at Jardine during the receivership of Alex. Livingston, some interesting facts have been obtained. Mr. Andrews says on January 27 the Bear Gulch and Gold King Mines were consolidated by transfer to the Kim-

berly-Montana Gold Mining Company. The receivership is practically at an end, and operations have ceased temporarily, pending the installation of water power for the 2 new mills of 40 and 60 stamps, air compressor, and cyanide plant for treatment of tailings. The receivership covered about 4 months, during most of which time the old 20-stamp mill handled a daily average of 85 tons. With the proceeds of the mill the receiver met all current expenses, discharged prior debts for new mill construction, etc., amounting to $20,000, and by February 1 had accumulated a handsome surplus. The cost of operation was gradually reduced by the receiver, until in January the total charge against a ton of ore was $3.99, divided as follows: Mining and timbering, $2.76; milling, .92; office and management, .025; hauling, .06. The profit for the month of January, over and above all running expenses, exceeded $12,000. Steam power was used in the mill, and all mining was by hand drilling. With the proposed improvements and largely increased tonnage the Kimberly people should handle their ores at a total cost of not exceeding $2.25. To date no power drills have been used in the district.

The ore-bearing zone is a wide belt of schist carrying many shoots of ore, some having the appearance of veins between well defined walls, others being large lenses. No great depth has been attained, all development has been by tunneling. The characteristic ore is a rather hard but easily worked quartz, containing a varying amount of arseno-pyrite. Amalgamation saves about 66 per cent of the value, and cyanidation, judging by the tests of F. L. Bosqui, will recover 70 per cent of the tailings contents. There are practically no silver values. The bullion averages over $16 an ounce. During the 3½ years that the old Bear Gulch Company operated the property, the 20 stamp mill produced in bullion over $700,000, the tailings now impounded are estimated to have a value of $100,000, and it is claimed that fully $150,000 in values went down the creek.

SILVER BOW COUNTY.

(*From Our Special Correspondent.*)

Snohomish & Tramway.—Attorneys for F. Aug. Heinge have filed with the Federal Court, sitting at Butte, objections to 4 reports made to the court covering the operations of Receiver John S. Harris on these two properties. Heinze claims ownership to a one-half interest in the Snohomish and to a one-third ownership to the Tramway. The property has been in the hands of the receiver nearly 4 years.

MARYLAND.

GARRETT COUNTY.

Withers Mining Company.—About 1,600 acres of coal land belonging to this company sold at public auction recently for $102,000. R. R. Henderson, the purchaser, is said to have acted in the interest of the Somerset-Pennsylvania Coal Company.

NEVADA.

ELKO COUNTY.

Dexter.—This mine at Tuscarora, has temporarily stopped work, owing to a short supply of water for the mill.

LYON COUNTY.

Douglas.—At this group of claims employing about 6 men, a small hoist and a gasoline engine and blower are to be installed.

LINCOLN COUNTY.

Searchlight District.—This district is near the Colorado River, and most conveniently reached from Goff's station on the Santa Fe Railway in California. The district was opened up about 4 years ago and comprises a large mineralized territory covering an area of 30 miles in length by 15 miles in width. The town of Searchlight has a population of about 600 and 3 mines in operation. The properties are the Southern Nevada Mining Company, Duplex Mining Company and the Quartette Mining Company, each equipped with stamp mills. A number of smaller properties are also worked. The ores of the district are free milling gold and average values run about $15 to the ton.

NEW YORK.

JEFFERSON COUNTY.

Old Sterling Iron and Mining Company.—Labor agitators some time ago started to organize this company's miners, and a lodge with 15 members was formed at the Little Dickson Mine, near Antwerp. The company recently closed the mine, throwing about 20 men out of work. The men at the Old Sterling do not belong to the union, and are not affected by the shut down. During the past year the company has spent about $100,000 in improvements.

OHIO.

BELMONT COUNTY.

Weaver Coal and Coke Company.—This company of Pittsburg, Pa., is preparing to sink 4 shafts in addition to the tow sunk and partly equipped, at Glencoe. The Glencoe shafts will be ready in about 6 weeks, but the 4 new shafts will not be ready before fall. The company has 6,000 acres of coal land in this county, and will have a daily output of 6,000 tons from its 6 mines. Machines will be used for cutting the coal. Including all its mines in Ohio, Indiana, Illinois and West Virginia, the company expects to have a total output of 50,000 tons daily by next fall.

OREGON.

BAKER COUNTY.

Baisley-Elkhorn.—F. P. Hayes, president of the Beaver Mining Company, who recently acquired this property near Baker City, proposes to drive a 6,000-ft. tunnel, doing away with pumping.

GRANT COUNTY.

Alamo Consolidated Mining and Milling Company.—The ore-body developed in the upper levels of the Alamo Mine is reported cut at a depth of 510 ft. by the 1,200-ft. tunnel. The ledge is said to be 15 to 20 ft. wide, carrying good values in gold. J. F. McQuigan is president and manager of the company, and John R. Cassin, of Spokane, Wash., is secretary and treasurer.

LANE COUNTY.

Oregon Securities Company.—A statement issued by this company says that development on the Helena, Musick 10-stamp mills to the Champion mill site, Champion 10-stamp mill is running steadily on good ore. At a recent meeting of the directors the superintendent was authorized to move the Helena and the Musick 10-stomp mills to the Champion mill site, making a 30-stamp mill in a good location, where work can continue the year through. The Musick and Helena mills cannot now work when the snow is deep. The equipment will be increased by 12 concentrating tables. The company will construct a dam and erect an electric plant having 1,000 h.p. capacity to furnish power and light for all purposes about the mines and mills. A wagon road is to be built from Champion Basin to the Oregon & Southwestern Railroad, a distance of about 8 miles. The improvements will cost about $100,000, and the superintendent thinks they can be completed by July 1. G. B. Hengen, St. James Building, New York City, is secretary of the company.

UNION COUNTY.

Sanger Gold Mines Company.—This company controls 600 acres of ground, including the Sanger Mine, 23 miles northeast of Baker City. The ground embraces both lode and placer claims. The past production of the Sanger property is given as over $1,500,000 in gold by government reports. There are 4 quartz lodes on the property, the Summit vein having been credited with yielding the returns mentioned. The ore is free milling. A winze has been sunk on the vein 300 ft. below the present workings. According to a prospectus issued by the company the Fir Gulch vein is expected to prove even richer, but work on this vein was hampered for 20 years by litigation over titles. The company controls water rights on Eagle Creek capable of developing 1,000 h.p., and has a fully equipped 10-stamp mill, hoist, pumps, boiler, engines, air compressor and all necessary buildings. The title to the property is stated to be clear, and preparations are started for active work. A cross-cut started for the Fir Gulch vein is in 1,270 ft. The company is capitalized at $2,500,000 in $1 shares. The officers are: F. W. Paine, president; J. E. Bingham, vice-president; F. A. Moore, treasurer, all of Walla Walla, Wash., and J. K. Romig, Baker City, secretary.

PENNSYLVANIA.

ANTHRACITE COAL.

Greenwood.—The Lehigh Coal and Navigation Company is preparing to extinguish the fire in this mine near Tamaqua. The fire started in 1856. The company will sink bore holes and smother the fire by flushing culm into the workings.

Lehigh Coal and Navigation Company.—This company is to construct a large breaker in the rear of No. 10 colliery at Tamaqua, which will be abandoned. A railroad spur 1 mile long is being constructed to connect the Jersey Central tracks with the new site. Preparations have been completed to sink 2 shafts, each 600 ft. deep.

Philadelphia & Reading Coal and Iron Company.—This company has men at work on a new washery at Shenandoah, having leased the Kohnoor culm banks. The washery will handle 1,500 tons of culmn daily, and will employ 150 men and boys.

Stanton.—This mine of the Lehigh & Wilkes-Barre Coal Company, in Wilkes-Barre, has resumed work after a year's idleness. It was flooded last February, and was cleared about the time the big strike began. Then as the steam men went out it was again flooded and badly damaged. It employs 700 men.

BITUMINOUS COAL.

Victoria Coal Company.—This company, of Uniontown, owned by J. R. and J. S. Laughery was sold to Hoyt L. Warner, of Cleveland, O., recently for $200,000. The company owned about 100 acres of coal land, of which 40 acres had been mined. The price is said to be the highest ever paid for coal in Fayette County.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Black Hills Porcelain Clay and Marble Company.—At the annual meeting held at Custer the following directors were elected: L. P. Woodbury, Chicago, Ill.; Joseph Seep, R. L. Boyer, Wesley Schlichter, Saginaw, Mich.; John A. Tolman, Brown City, Mich.; J. H. Chandler, Cleveland, O.; F. W. Bower, Hot Springs, S. D.; Charles D. Thompson, I. W. Herber, L. Hicklen and H. Pepper, Detroit, Mich.

Golden Mortar Mining Company.—The development shaft is 75 ft. deep, and a cross-cut is being run.

Old Bill.—W. N. Wright has purchased the property of T. I. Wheeler, and is deepening the shaft.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Ak-sar-ben and University Companies.—A joint cyanide mill is planned to be built on Annie Creek.

Black Hills Belt Development Company.—Work has ended, owing to the refusal of the owners to grant an extension of the bond, which expires March 1. The Development Company has a shaft 700 ft. deep, from the bottom of which 2,600 ft. of drifts have been run.

Horseshoe Mining Company.—Charles Allis, of Chicago, recently elected president, has been directing operations. Herman A. Keller is general superintendent of work. The new cyanide mill at the Mogul Mine is enclosed, and machinery is arriving. The cyanide mill at Pluma station is to be converted from dry to wet crushing.

Jupiter Gold Mining Company.—The cyanide annex at the 40-stamp mill is in use.

Phoenix Gold Mining Company.—R. M. Maloney, Sol Rosenthal, Nathan Halle, J. G. Thomas, of Deadwood, and W. H. Lawson, of Chicago, Ill., are the organizers. The company is to purchase the Deadbroke Mine in Blacktail Gulch.

Rex Gold Mining Company.—Work is under way in two places.

Penobscot Mining Company.—B. C. Cook, until recently mill foreman for the Portland Mining Company, is in charge of the new cyanide mill.

Spearfish Gold Mining and Reduction Company.—The monthly gold output has increased from about $30,000 to $45,000. The ore averages $7 a ton, and the plant is treating 225 tons a day. Mining has heretofore been in open pits, but is now under cover, adding the cost of timbering. The ore is a siliceous limestone, the values lying along cleavage and joint planes. It gives 85 per cent extraction crushed to 4-mesh. The precipitates are refined at the plant.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Ajax Mining Company.—Work has been resumed in the Standby Mine, under the direction of E. R. Deffebach, of Rochford.

Columbia Gold Mining Company.—The main shaft is over 150 ft. deep. At 200 ft. a cross-cut will be driven.

Maloney Blue Lead Mining Company.—The formation has changed, and the officers believe the main vein has finally been found. It is gradually widening, showing a better percentage of copper than before.

TENNESSEE.

CUMBERLAND COUNTY.

Hilman Iron and Coal Company.—Owing to labor troubles this company has had at its new shaft at Sturgis since the work started, the company has ordered the mine closed, and the machinery removed. Manager Gifford will concentrate work at the Bell Colliery across the Tradewater River.

Chicago-Tennessee Coal and Coke Company.—This company, of Waldensia, has about 9,000 acres of coal land. A mine opened on slope is producing about 150 tons daily. Sixty coke ovens have been completed; work on 60 more is about to begin, and a third battery of 60 will be erected later. David S. McMullen, president, has charge of the developments. The offices are at 125 La Salle Street, Chicago, Ill.

UTAH.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Horn Silver.—This mine at Frisco shipped 2 cars ore to Salt Lake smelters in the week ending February 20.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—Shipments for the week ending February 20, were as follows: Mammoth, 8 cars; Bullion-Beck, 10 cars; May Day, 1 car; Gemini, 13 cars; Martha Washington, 1 car; Grand Central, 27 cars; Uncle Sam, 5 cars; Yankee Consolidated, 5 cars; Ajax, 1 car.

Centennial Eureka.—This mine will be lit by electricity. The plant will be in running order by June 1.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Boston Consolidated.—The report of R. Nichols, who lately examined the Bingham holdings of this company is said to advise the erection of a smelting plant.

Highland Boy Smelter.—Five cars, weighing about 320,000 lbs., went to Eastern refineries during the week ending February 20.

United States Smelter.—Order has been given for doubling the capacity of the ore bins.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Park City Shipments.—The Mackintosh Sampler reports these receipts for the week ending February 20: Daly West, 2,494,300 lbs. ore.

Park City Zinc Plant.—This plant is now treating ores mainly from the Daly-Judge. About 250 tons of concentrates are in the bins, and will go to the reduction work at Iola, Kans.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Black Diamond.—This Stockton property, under the management of Joseph Dedrich, has cut 2 ft. of ore in a drift to the north off the 150-ft. level. It is thought to be a spur of the Hercules ledge, which runs through the property.

Cyclone.—The tunnel has reached station, and drifting will start to open the ore bodies.

Johnny Company.—This company has started its new 50-ton mill at Stateline. W. J. Halloran, of Spokane, Wash., is secretary of the company. The plant saves the free gold values by amalgamation, while the concentrates are treated with cyanide.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Gold Hill Consolidated Mining Company.—This company has taken over the property of the Gold Ledge Consolidated Mining and Milling Company. The old company was incorporated with a nominal capital of 4,000,000 shares, at a par value of 5c. per share. The new company organized with 1,000,000 shares at a par value of $1, gives 1 of the new shares for 3 of the old shares, or 2 mills per share in cash. The new shares are pooled in two pools—pool No. 1 and pool No. 2. The terms of pool No. 1 are: That no certificate for stock therein will be issued prior to August 1, 1903; and that on or after August 1, 1903, certificates will be issued to holders of receipts on surrender thereof. The terms of No. 2 pool are: That the stock therein may be sold from time to time prior to August 1, 1903, at 6c. per share, for the account of all the owners thereof, according to their respective holdings; and that no certificates for stock in said pool shall be issued prior to August 1, 1903, except upon such sales; after that date, if any stock should remain unsold, certificates will be issued according to the original holdings; that the proceeds of sales of stock from this pool, as often as they amount to $10,000, will be distributed by the company to the persons entitled, pro rata, according to their original holdings; and on or after August 1, 1903, if any stock remains unsold, certificates shall be issued to the owners in like proportion.

Lone Pine-Surprise Consolidated Gold Mining Company.—The directors have given Charles Theis, of Spokane, Wash., a 60-days' option to purchase the company's property in Republic for $150,000. The company owes between $40,000 and $50,000, and has no money to continue work. The creditors are Charles P. Robbins, Leo H. Long and Thomas Ryan, three of the trustees of the company.

Quilp.—For the week ending February 7, 14 carloads of ore, amounting to about 400 tons, were shipped. The superintendent reports the mine looking well. Below the No. 4 level a drift has cut a 24-ft. body of ore. Five car-loads of ore were shipped from Republic to the smelters during the week ending February 14.

Republic Power and Cyaniding Company.—All the creditors of this and the Republic Consolidated Gold Mining Company, except the Royal Bank of Canada, to whom there is owing between $30,000 and $40,000, have agreed to take pro rata proportions of a bond issue in settlement of their claims. The bank, having a branch in Republic, has begun a suit in Ontario to recover the amount due. Efforts are being made to resume work in the Republic Mine, now being prepared for inspection by a committee. The mining and milling companies are practically under one ownership, and in order to preserve the property intact the milling company has executed a trust deed to G. W. C. Lanskail for the mill and all the company's assets.

Trade Dollar.—The Northwestern Smelting and Refining Company, operating the Crofton Smelter, at Vancouver, B. C., has offered a joint rate for transportation from Republic and treatment on Trade Dollar ore of $5.70 per ton. There are 200 to 250 tons of ore on the Trade Dollar dump. A car-load will be sent to the Trail Smelter at Trail, B. C., to be tested for its suitability to the Trail Smelter requirements. The balance will be sent to the Crofton Smelter. The Crofton Smelter will allow on Republic ores 95 per cent of the gold contents at $20 per oz., and 95 per cent of the silver at market price on the day of sampling, as shown by the ENGINEERING AND MINING JOURNAL quotations.

OKANOGAN COUNTY.

(*From Our Special Correspondent.*)

American Flag.—Two car-loads, making 50 tons, of ore have been shipped, and the mine is closed for the winter.

Bodie.—At this mine at Bodie drifts are being driven by 12 men on 2 shifts on the Nos. 3 and 4 levels.

Little Chester.—This claim has been leased for 2 years, on 10 per cent royalty. A shaft is down 100 ft.

STEVENS COUNTY.

Gold Bug Mining Company.—This Tacoma company has resumed work on the Gold Bug claim at the head of Pierre Lake, near Bossburg. The 165-ft. shaft is to be sunk 100 ft. George Bishop is superintendent. The claim is equipped with a steam hoist and a pump.

WEST VIRGINIA.

MARSHALL COUNTY.

(*From Our Special Correspondent.*)

Glen Easton Coal and Coke Company.—This company formed of Moundsville and Pittsburg men, with offices at Moundsville, has bought 12,000 acres of coal between Moundsville and Glen Easton, and will open 2 large mines, the openings being so situated that the coal may be run to one tipple. Arrangements are to be made for the construction of large barge works for river transport.

TAYLOR COUNTY.

(*From Our Special Correspondent.*)

Wabash Coal and Coke Company.—This company is paying farmers $12.50 per acre for coal property. The deals are made by John T. McGraw.

WYOMING.

BIG HORN COUNTY.

United States Potash Company.—It is reported that this Detroit, Mich., concern is to sink a drill near the Du Man's hot springs not far from Cody in search of potash salts. The company is capitalized at $100,000, and has 9 claims near the springs.

FOREIGN MINING NEWS.

AFRICA.

TRANSVAAL.

The production from Transvaal mines in January is reported at 199,279 oz. fine gold, against 70,340 oz. in January, 1902; the increase being 128,939 oz.

CANADA.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crows Nest Pass Coal Company.—The mines at Fernie are practically closed, owing to another strike of the miners, which started a few weeks ago. This strike, unlike that of last summer is not over any system of payment or time keeping, but is for straight out recognition of the union. The strike is indorsed by the Western Federation of Miners. Manager Tarkin says that the men are very well paid. skilled men making higher wages than in any other coal mine in the West. He absolutely refuses to recognize the union. Meantime, the coke ovens are idle and the smelters at various points in the province may have to close if the strike lasts much longer. The Northport Smelter, at Northport, Wash., has already shut down, and the Trail Smelter has but a few days' supply of coke. The smelters in the Boundary District and the mines at Rossland may have to close also.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Velvet Rossland Mine, Limited.—The management of this mine at Rossland reports ore shipments as follows:

	Tons.
Last 5 months of 1902	1,578
Jan. 1-13, 1903	130
Jan. 14-20	172
Jan. 21-27	248
Jan. 28-Feb. 3	230
Total shipments, 1903, to Feb. 3	780

ONTARIO—LAKE OF THE WOODS DISTRICT.

(*From Our Special Correspondent.*)

Iroquois Gold Mining and Milling Company.—Tascher, on the Canadian Pacific Railway, near Wabijoan, is attracting attention. Joseph Johnston, general manager of the above company, has been at Tascher with a gang of men, shipping 3 tons of ore to Walmsley, N. J., to have a mill test made prior to installing machinery. The company's offices are at 21 Park Row, New York. Morris L. Muriman is president.

Reliance.—Work has been resumed at this mine in Maniton District.

ONTARIO—ALGOMA DISTRICT.

Lake Superior Power Company.—Work has been suspended on the Josephine exploration, Michipicoten Range, for the winter, but will perhaps be resumed early in the spring.

QUEBEC.

Grenville Graphite Company.—This company's property is located on the Canadian Pacific Railway, near the Calumet River. At a recent meeting of the officers and directors at Wilkes-Barre, Pa., plans for a large mill, to have a capacity of 100 tons daily of rock, carrying 30 per cent graphite, were discussed. Morgan B. Williams, of Wilkes-Barre, and G. M. Williams, of Kingston, Pa., are interested in the company. The officers are W. E. Cooper, of the Kingston & Pembrook Company, president; Thomas P. Borden, of New York City, vice-president; and W. J. Bynes, of the Black Diamond Coal Company, Wilkes-Barre, secretary.

MEXICO.

OAXACA.

Compania Minera Zapoteca.—This West Virginia corporation, with an authorized capital stock of $1,000,000, has been organized in St. Louis, Mo., to take over and operate the Zapote group of 11 claims and 21 other undeveloped claims in the Tarichi camp of the Ocotlan Mining District. Frank A. Vickery is the resident director, and Guillermo W. Thompson superintendent.

SONORA.

(*From Our Special Correspondent.*)

Creston de Cobre.—A new group of mines to which the owners, Dr. J. McCallum and J. L. Sheppard, have given the above name, is now being developed. The mines are situated on the banks of the Yaqui River, not far from the Dura group.

DURANGO.

(*From Our Special Correspondent.*)

Vacas.—It is reported that these mines, over which there has been so much litigation, are about to change ownership, negotiations for purchase by United States capitalists being in progress.

NEW CALEDONIA.

Societe de Chrome.—This company has been organized in France, with 3,800,000 fr. capital, to work chrome ore mines in New Caledonia. The head office is at No. 19 Rue de Clichy, Paris. Baron Dijeon is president; L. Bernheim, manager; A. Desmazures, administrator, and M. Gex managing director in New Caledonia. The new company owns three distinct groups—one at South Bay, the second at Plum, and the third at Thiebaghi. The last group is leased to a syndicate, which has undertaken to extract a minimum of 10,000 tons annually, paying a royalty of 15 fr. per ton. The mines near South Bay appear to be very rich, and arrangements are in progress for the construction of a railway, which will bring the ore to the bay, one of the best ports in New Caledonia. These ores contain from 50 to 60 per cent of sesquioxide of chromium. The mines of the Plum group now being worked have already yielded a large quantity of ore, and are about to be placed under improved management, with the view of increasing the output. N. Duhamel will have charge of the mines at Thiebaghi, and M. Jellineck of the workings at Plum.

MINING STOCKS.

(Full quotations are given on pages 354 and 355.)

New York Feb. 24.

Trading in mining shares was largest previous to the Washington Birthday celebration, which began on 'change on Friday afternoon, February 20, and lasted until Tuesday morning, February 23. When business reopened the professional element again took hold of the market, invariably taking profits and causing declines, which, however, were soon recovered, as the better metal market reports encouraged speculation.

On February 24 Amalgamated touched high mark this year at $74½, initiating large sales. On February 19 the price was as low as $71. Anaconda's extreme quotations were $30⅞ on February 18, and $29⅜ on the 20th, while sales were comparatively large. Both stocks were improved by the belief that Amalgamated would increase its next quarterly dividend. Originally Amalgamated paid 8 per cent per annum, but now pays only 2 per cent on par, $100.

On curb Tennessee and Greene Consolidated, of Mexico, continue the favorites. The former sold at $29½@$31, and the latter at $23⅜@$25¾. A few Boston coppers have been sold, but this business is necessarily restricted. United, of Montana, brought $29@$30, and White Knob, of Idaho, 12@13½c.

Bamberger-De Lamar Gold, of Nevada, shares sold on curb at $10½@$10⅞, or a fraction above par. Attempts to interest traders in Tonopah Gold Mining shares have been made with the result that sales are reported at $10½@$10¾ for the stock, $1 par value. The capital is $1,000,000, and the property is in the Tonopah District, Nevada, a new district, which is attracting much attention.

Ontario Silver, of Utah, found buyers at $6⅜@$7, but so long as the metal market is down no activity need be looked for in this or any other silver stock.

In the Colorado list the Cripple Creek shares are weak, being influenced by the Western market. Portland continues to sell around $1.50, Elkton at 39@40c., and Isabella at 23c.

Alice, of Montana, long silent, has come forward in better shape, selling at 40c.

The Comstock stocks have their supporters who believe in the future of the Lode, but it is evident that the recent high prices cannot be maintained while assessments are on the docket. Best & Belcher has been lowered to $2.15, Consolidated California & Virginia to $2, Ophir to $2.20, and Hale & Norcross to $1.05. The others have sold at corresponding declines, except Comstock Tunnel stock, which brings as much as 11c., while the bonds are several cents lower than this price.

Boston. Feb. 24.

(From Our Special Correspondent.)

A slightly lower range of values, as a rule, has resulted from the week's operations in the market, yet the changes are important. This is naturally the result of dullness, and does not disturb the believers in much higher figures for copper shares. Thus far it has been largely an artificial market. Reports are current of sales of Lake copper at 13¼c., and the talk is that 13½c. will soon be quoted for the Lake brand.

Toward the end of last week prices began to sag, and business was restricted, due, no doubt, to the approaching holidays. The opening on Tuesday was quiet, but as the day wore on there was more snap, and the closing was quite sharp, which presages a better market. Money has been fairly snug, and some banks are loath to take copper shares as collateral. Let a good, broad, active market show itself, however, and this factor will soon disappear. Last week's break was the first of any consequence since the upward movement began some weeks ago, and it undoubtedly served a good purpose. Little or nothing can be learned of the new Lake Copper Company, mentioned last week, and it is guessed that the announcement was premature. That plans of this sort are on the tapis there is no doubt, and it is thought time will see the fulfilment of a great many plans. Standard Oil capital is invested in a number of the Michigan properties, and many surprises may be expected.

Trimountain advanced $7.50 during the week to $106.50, and the Street expects to see it move by leaps some day. Copper Range Consolidated made its high record last week at $75 per share, but reacted to $71.25, with subsequent recovery to $74. Trimountain stock represents $20 paid in, including the original subscription of $12, of which latter amount, $4 per share, was placed in the treasury. At present the mine is producing about 1,250,000 lbs. of fine copper per month, with three stamps. Osceola fell $2.50 to $74, but has recovered $1 of it. It is said that the opposition to the present management has secured proxies on about 30,000 shares of stock to be voted at the annual meeting, March 12. Some local houses have been asked to co-operate with the Lake people in this movement, but so far without success. President Bigelow will go abroad in the spring. Tamarack has advanced $7 to $187. The Tamarack annual report is expected to show $4 per share earned on the stock for 1902; this seems excessive, however. Centennial sagged $1.75 to $30, but rallied to $31.37½; Mohawk broke $2.75 to $54.25, but recovered to $55.50, and Utah slid off $1.25 to $31, with recovery to $31.50; Calumet & Hecla is off $15 to $525; Bingham sold down $2.62½ to $35.75, with recovery to $36.50.

United States Mining has ranged from $25.50 to $26.25 since November, when the smelter started up. The company has received over $400,000 gross, and at present is paying off the small floating debt. The trustees' report will issue next week. A large buying order resulted in putting United States Coal and Oil up $1.12½ to $15.87½. No encouragement is being given in this stock for an upward movement. The company expects to ship coal in a few months. Winona sagged 75c. to $8.25. This company is said to be paying expenses from the small amount of rock being treated. A $2 break in Dominion Iron and Steel to $52 must be noted, although it subsequently sold at $55. Quincy sold at $123@$121.50, and Adventure at $14.50@$14.75. The issue of the annual reports of these companies was without effect. American Zinc spurted $2.75 to $11.

Colorado Springs. Feb. 20.

(From Our Special Correspondent.)

The market closes this week far from satisfactory, owing to a struggle precipitated this week between the Western Federation of Miners and the United States Reduction and Refining Company over the attempt to unionize the Colorado City plants of the company. Like a flash out of a clear sky came the announcement on the 15th that a strike had been ordered against the Standard Mill, the only plant of the United States Company now in operation at Colorado City. Of the 200 men employed, but 25 responded, and barring some inconvenience for a day or two operations at the big mill have continued uninterruptedly since that time, although under a guard of deputy sheriffs of El Paso County. Rioting on a small scale was attempted on the 16th, but suppressed by the civil authorities as well as the unions; so that a semblance of peace is maintained, although the battle is by no means concluded. The owners of the Standard Mill have filled the places of the strikers, and are stocking their plants with food and bedding, anticipating a long fight, as they announce that they will not accede to the demands of the strikers, as the trouble has been precipitated entirely by the interference of outside labor leaders. The effect of all this, however, has been to create considerable uneasiness, and manifested itselt in a decidedly weak market, which feeling has worn off in a very large degree as far as the stock market is concerned.

The listing committee of the Colorado Springs Mining Stock Exchange took radical measures this week in revising the entire stock list, readjusting the securities according to their market worth. This is the first important action taken on these lines in the past two years and comes in most timely. The stocks are now arranged in three classes, the mines, the prospects and a heterogeneous mass of weaklings styled the miscellaneous list. After March 1 the call will be held only in mines and prospects with privileges to call up any stock of the miscellaneous class desired.

Salt Lake City. Feb. 20.

(From Our Special Correspondent.)

The exchange of stocks on the local board this week shows larger in volume of business done than last week, and, in fact, the advance has been quite steady for the last month, since each week indicates the condition. The volume this week as represented by shares is 301,230, and by money, $176,670. A few of the more favored and well known stocks have fallen off a few points, among the number being Daly, Daly West, Daly-Judge, Consolidated Mercur and Utah. The lesser lights have become more luminous, and, as usual, brace up the list when needed.

San Francisco. Feb. 21.

(From Our Special Correspondent.)

The boom is gradually subsiding. Prices are weaker, and stocks rather heavy, as a rule. Outside buying is falling off, though there have been some orders on the lower prices. The quotations, however, are still high in comparison with those of a few weeks ago.

Caledonia is quoted at $2.20@$2.25; Best & Belcher, $2.25; Consolidated California & Virginia, $2.10@$2.20; Hale & Norcross, $1.25.

Oil stocks were active, and prices generally higher. Kern Oil sold up to $5.25, and Sterling to $3.50. Occidental brought 18c., and 14c. was quoted for Independence.

COAL TRADE REVIEW.

New York, Feb. 26.

ANTHRACITE.

Though prices at seaboard points have fallen greatly, to the loss of speculators and to the confounding of co-operative coal companies that were going to do all sorts of possible and impossible things—yet the market for anthracite continues strong, there being a good demand all through the West and at inland points in the East. Shipments by rail to relieve the shortage at points as far west as Chicago are much hindered by the congestion of traffic on all railroads; in fact, Western market conditions may be expected to remain abnormal until lake navigation opens.

In Chicago territory, owing to the blizzard which restricted greatly the movement of coal, prices last week rose 25c. per ton, and more in some cases, but with milder weather prices have fallen. Along the lower lakes, also, the blizzard emphasized the congested conditions on the railroads, and receipts of anthracite were delayed considerably. However, the tonnage on the way from the mines is heavy, and a few days of good transportation permits enough coal to arrive to keep prices down. At Buffalo speculative prices for independent coal having fallen almost to a parity with the regular prices of company coal. In the all-rail trade to points between the seaboard and the lakes trade is brisk, the storms and cold weather of last week having increased an already good demand. Along the seaboard the blizzard had least effect. It hampered shipments from the mines slightly, but such a large tonnage of coal, is held at tidewater, some of it bought at $3 over present quotations, that any temporary interruption of traffic has little effect on the trade, except as regards retail business. It is reported that one lot of prepared sizes sold at Boston this week for $4, alongside, the unlucky seller seeing demurrages charges accruing, and concluding that he had nothing to gain by waiting. With collieries getting out as heavy a tonnage as the mine labor will allow, and with spring less than 6 weeks away, there is no prospect of prices advancing. Newspapers that really did most, by talking about a coal famine and scaring the public, to enable dealers to run up prices, are now claiming that they made the operators put prices down, supply and demand having nothing to do with the matter. Investigating committees of various kinds find that their labor has been wasted, and suits brought by notoriety seekers against the "coal trust" are now being allowed to sink into oblivion. A winter milder than ordinary, and the exertions of the operators have brought market prices at tidewater down to near last winter's figures. The regular price for free burning white ash coal, egg, stove and nut sizes, f. o. b. New York Harbor shipping port is $5.

BITUMINOUS.

The Atlantic seaboard bituminous market is easy and weak, as is usually the case just before the contract season. There are large amounts of coal discharging at distributing ports, or waiting to discharge. The figures for Providence are 70,000 tons, and for Boston and Portland over 100,000 tons each. There is considerable gossip in the trade about the losses of some concerns, which plunged heavily and have a large tonnage taken at high figures, now on the way or lying in barges to be sold at something under current rates. One sale is reported at Boston at $3.25 alongside. However, it is altogether likely that the previous profits of the plungers far exceed present losses.

At the meeting of the trade in Philadelphia last week there was a general discussion, rather brief, of market conditions, and of possible prices for coal on new contracts. It is reported that no minimum prices were fixed at the meeting, the understanding being that an advance of 65c. over last year's figures, with variations as to quality of coal, will be made. Certain coals may thus sell for only 25c. more than last year, while the advance on some grades may reach 75c., the highest basis for new contracts given being $2.25 per ton at the mines, from which figures it is thought contracts will graduate down. Few contracts are reported closed as yet, as buyers are holding off at the prices offered. Special grades of coal will likely sell at full prices throughout the year, while the price of ordinary Clearfield may fall. Everything depends on the railroads. Good car supply and quick transportation will send prices to lower than contract figures during next summer. Poor car supply and slow transportation will keep prices up. Railroad officials are reported as saying that the question before them now is how to get needed skilled train crews. There are reports that some railroads have recently received new locomotives, which they are unable to man. Another disturbing factor in the market is that agents here of foreign coals are seeking trade direct, offering coa lthat can be delivered regularly, with ordinarily low freight rates, alongside at any available Atlantic port at prices lower than any heard hitherto.

At points beyond Cape Cod trade is quiet on account of heavy arrivals from domestic and foreign ports. Along Long Island Sound, the market is easier than it was on account of heavy arrivals of foreign coal and of steam sizes of domestic anthracite, but the demand is heavier than beyond Cape Cod. At New York Harbor points trade is quiet and consumers apparently have all the coal they need. Speculative prices for domestic coal range around $3, f. o. b. shipping port. All-rail trade is more active than that

of any other consuming territory, though consumers ask for lower prices.

Transportation from the mines to tidewater is better than it was, coal in some cases coming through in 4 or 5 days. Car supply shows no change, being about one-third of the demand. Seizures of coal by the main line roads have fallen off. In the coastwise vessel market vessels are plentiful and rates weak. Rates from New York Harbor are 70c. to Long Island Sound ports and Providence, and $1.15 @$1.20 to Providence. From Philadelphia rates are 75c. to Long Island Sound, and $1.20@$1.25 to Providence.

Birmingham. Feb. 23.

(From Our Special Correspondent.)

During the past week incessant rains and extremely cold weather interfered with the daily production at the mines. Two or three large mines were idle for a few days, but everything is again in full blast. It is announced that one of the large producers of coal in this State has received an order for a sample lot—5,000 tons—from a corporation in Cuba. The coal company is handicapped, however, by the railroads in this immediate district, begging constantly for all the coal they can get with which to operate their lines and claiming that their needs should first be looked after before the outside trade is sought. There is no doubt that the coal mined in Bibb County could stand the travel from here to the Gulf at Pensacola and thence to Cuba. The order, though, was not accepted for the reasons above stated. It is possible that some of the coal will be shipped as a trial.

At the latest meeting of the City Council of Birmingham an application for a charter was filed by the Birmingham District Coal, Light and Power Company, the company which Messrs. Aldrichs have organized. The company has coal lands within 6 miles of Birmingham. It is proposed to open mines and use the slack and waste coal at the mines for the generating of electricity. The electricity will be carried by wires into the city and furnished to consumers at prices, it is claimed from 30 to 50 per cent cheaper than the present rates. Mr. T. H. Aldrich, Sr., asserts that he means business. The franchise will be acted on at the next meeting of the Council, March 4.

The Mississippi Cannel Coal Company is now shipping coal from mines in Walker County. Howels & Jones are sinking a shaft at Blocton, and expect to reach a fine seam of coal within 250 ft. from the surface. The Tennessee Coal, Iron and Railroad Company is filling its No. 2 mines at Blocton with men, the ventilation of this mine having been improved wonderfully by the installation of a Chappell fan.

Chicago. Feb. 23.

(From Our Special Correspondent.)

Despite the coldest weather of the winter in the last week, there is little new to chronicle in the coal market. The cold was intense, but it did not last, and the previous two or three weeks of mild weather had loaded everybody with an ample supply of the only grades that are selling in Chicago to any extent now, Indiana and Illinois bituminous. On account of this stock the railroad condition was not serious; the city was probably well equipped for two weeks, rather than a week of severe winter weather. From now on to the opening of Lake navigation there is little prospect of a rise in prices, and every probability that the supply of bituminous will be improved constantly. The railroads have, after much delay, got into condition to handle the large coal traffic caused by the winter, and they will not fall behind in the face of the fierce public criticism they met two months ago.

To-day's quotations are: Hocking, $5; Youghiogheny, $5; West Virginia, $4.75; smokeless (Pocahontas and Maryland), $5.50; Indiana and Illinois lump or egg, $3.50. These prices are for car lots.

The municipal coal yards, established by the politicians for the alleged purpose of benefiting the needy poor by selling coal at cost price, have been abandoned. No official explanation of the abandonment has been made, but none is needed; under the methods used it was impossible to make a success of the project. The politicians or their friends got the coal, not the people. Much trouble was experienced by poor people in getting back their money after they had deposited it a week before they expected to get their coal, or made any demand for it.

Cleveland. Feb. 23.

(From Our Special Correspondent.)

The rather optimistic view which manufacturers were inclined to take of the coal situation last week has changed again. The storms which swept the country tied the railways into knots, and while coal was coming in freely last week, very little has come in since. The insignificant stocks which a few factories had begun to acquire vanished in a couple of days. The coke situation is unchanged. It is still very scarce and is, if anything, growing scarcer. The increasing demands of the United States Steel Corporation upon its own resources of coke are making the available supply for the independents slimmer. The embargo which the railways have placed upon several articles, such as scrap, does not appear to have amended the fuel question any. The railways are hopelessly congested again. All talk of the coal trade on the great lakes is in the air. Fuel for steamships is going to be higher, but no one knows how much higher it will be, and until that point is settled the vessel owners are fighting shy of establishing the freight rate. It will probably be two weeks before this point is settled. Every one is looking forward, however, to a profitable Lake season in the coal trade. There is an enormous demand for coal in the Northwest, which has been living a hand-to-mouth existence, and paying high prices for what it got, as nearly all the coal now unconsumed went here by the all-rail route—a mighty expensive method in comparison to the water route. It is likely that the coal vessels will start northward at the earliest possible moment, and probably will not wait for the rivers to be entirely free from ice. Vessel men are approaching the season of navigation with a great deal of complacency, because they believe it will be a profitable one. The coal rate is, of course, unsettled except for a few individual charters for single trips, which are merely a drop in the bucket.

Pittsburg. Feb. 24.

(From Our Special Correspondent.)

Coal.—The supply of railroad cars at the mines to-day was less than at any time within the past three months. As a result outside of the river mines, and those on the Monongahela division of the Pennsylvania and on the Pittsburg & Lake Erie, not more than 30 per cent of the mines are in operation. The Pittsburg Coal Company is a heavy sufferer, but several independent concerns are even in worse shape. The new schedule of prices to take effect on April 1 has not yet been announced. It is certain, however, that the advance will be fully 25 per cent, owing to the increased cost of production and the higher freight rates. A meeting is scheduled for to-morrow at Cleveland, at which the rates for coal to the Northwestern markets for the season are to be established. All the Pittsburg interests engaged in the Lake trade will participate in the meeting. The district dead work scale has not yet been adjusted. The conference between representatives of the miners and the operators continued all of last week, and is not ended. There is no doubt that an agreement will be reached.

Connellsville Coke.—The shipments last week were bad, owing to the excessive cold weather, but an improvement is predicted for this week. Contracts for furnace coke for the first half are still being made at $4, but heavy premiums have been paid for urgent delivery. The *Courier*, in its last report, gives the production for the previous week at 242,886 tons. The shipments for the week aggregated 10,297 cars, distributed as follows: To Pittsburg and river tipples, 3,771 cars; to points west of Pittsburg, 5,284 cars; to points east of Connellsville, 1,242 cars.

San Francisco. Feb. 21.

Mr. J. W. Harrison's monthly circular says: "Since the *Ventura* sailed there has not been an arrival of any coal carrier from Australia. The last delivery of Colonial coal was on January 14. This is a very exceptional occurrence, to have 35 days elapse without an arrival from any Colonial coal port. Furthermore, there are only three vessels that can arrive here before April next, which leaves our market with a very small stock on hand. The loading list at Newcastle, including five vessels now en route, foots up 15 ships, with a carrying capacity of 50,000 tons; this is double the amount listed when the last steamer left here, and it may be safely figured that a further increase of coal tonnage will be engaged when the grain carriers from here begin to arrive at Sydney and Melbourne; besides, the abrogation of the coal duty should enlarge sales. A further incentive for Colonial shipments is a reported strike among the colliers in British Columbia, which may last several months, as they ask a pronounced advance in wages above the present schedule.

"The recent merging of several of the leading wholesale dealers should minimize competition and establish a more uniform standard of values. It is sincerely to be hoped that the northern labor troubles will come to an early termination, so that business may move along smoothly; its continuance proves detrimental to all concerned, producer and consumer."

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington, $8.50; Southfield, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present entirely nominal, but quotations continue at $14 for Pennsylvania anthracite and $12 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $9; Brymbo, $7.50; Wallsend, $6.50. There is no Eastern anthracite on hand, and Cumberland is rather scarce.

Foreign Coal Trade. Feb. 25.

Export trade continues quiet, and very little new business is reported. Imports of coal continue on a considerable scale. Considerable inquiry for coal for Atlantic ports is reported in England.

Exports of fuel from Great Britain in January were, in long tons:

	1902.	1903.	Changes.
Coal	3,027,160	3,568,892	I. 541,732
Coke	57,723	62,096	I. 4,373
Briquettes	88,891	52,476	D. 36,415
Totals	3,173,774	3,683,464	I. 509,690

In addition to these exports there were shipped abroad for the use of steamers in foreign trade 1,345,638 tons of coal, against 1,202,269 tons in January of last year.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of February 14 that the general tone of the Welsh coal market remains quiet. Best small steam coals continue in good request. Quotations are: Best Welsh steam coal, $3.54@$3.60; seconds, $3.48; thirds, $3.30; dry coals, $3.30; best Monmouthshire, $3.24@$3.30; seconds, $3.18; best small steam coal, $2.16; seconds, $1.98; other sorts, $1.86.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market is quiet, and Mediterranean rates continue firm. For other directions rates remain steady. Some rates quoted are from Cardiff: Marseilles, $1.60; Genoa, $1.62; Naples, $1.56; Singapore, $2.52; Las Palmas, $1.56; St. Vincent, $1.75; Rio Janeiro, $2.40; Buenos Aires, $1.98.

IRON TRADE REVIEW.

New York, Feb. 25.

Generally the iron trade still shows a tendency to hold back contracts as far as possible. In some branches, however, notably in structural steel, there is a good deal of pressure for materials.

In the Central West production is still much delayed by transportation difficulties. Furnaces and mills are unable to get supplies, and output is very irregular.

Exports of pig iron from Great Britain to the United States in January were 49,946 tons, against 7,134 tons in January, 1902.

Birmingham. Feb. 23.

(From Our Special Correspondent.)

Some sales are being made for delivery after July 1. While these sales do not aggregate a very large amount of iron, it is shown that there is going to be a big demand, and some of the consumers are getting in early in their purchasing. The production of pig iron in Alabama is a little heavier now than it has been during the past two months. The Tennessee Coal, Iron and Railroad Company has but one furnace now out of blast in this State, while the Sloss-Sheffield Steel and Iron Company is rushing the work of repairing on its Philadelphia Furnace at Florence and expects to have it in blast before March 10.

Quotations are firm. While consumers are inquiring as to reductions, the furnacemen are not anxious to sell except at stated prices. The following prices are given: No. 1 foundry, $19.50@$20; No. 2 foundry, $18.50@$20; No. 3 foundry, $17@$18; No. 4 foundry, $16.50@$17; gray forge, $16@$17; No. 1 soft, $20; No. 2 soft, $18.50@$20.

There is not so strong a demand for finished iron and steel. The rolling mills in this district are doing fairly well in the way of giving the many employees work, but there is some accumulation of stock. The Southern Bar Iron Association is to meet this week in New Orleans. In steel manufacturing in this district there is nothing new. The plant of the Alabama Steel and Wire Company at Ensley is doing well. The steel plant of the Tennessee Coal, Iron and Railroad Company at Ensley is doing nicely also.

Foundries and machine shops have as much work to do all the time as they can handle well. Some of these industries have been forced to refuse work because of the crowded conditions of affairs.

The annual meeting of the Sloss-Sheffield Steel and Iron Company will be held in Jersey City, March 17. The report to be made at this meeting will be a very fine one, showing that the company has been earning largely.

Chicago. Feb. 23.

(From Our Special Correspondent.)

The pig iron market is perhaps a little brisker than it was last week, but the change is slight and not sufficient to affect prices. On account of the storm and severely cold spell of last week there has been somewhat more difficulty in getting shipments of coke delivered, but this is an old complaint, and the cold did not last long enough to affect this week, in all probability. Coke is the chief thing about which the furnaceman and the foundryman alike are anxious; it is impossible to get anywhere nearly enough to meet demands. Consequently, furnaces have to close and

foundries to fall behind in their deliveries, when they too do not have to shut down. Foundry coke is quoted to-day at $9.50.

Spot lots of iron or those for delivery within one to two months continue to be most eagerly sought after. For delivery in the third quarter of the year a fair business is being done, at the following prices: No. 1 Northern, $23.50@$24; No. 2 Northern, $23@$23.50; No. 3 Northern, $22.50@$23; No. 1 Southern, $23.35@$23.85; No. 2 Southern, $22.85@$23.35; No. 3 Southern, $22.35@$22.85. There seems little probability of change in the prices of iron for several weeks. The transportation problem seems to be the chronic one in considering betterment of the market.

Cleveland. Feb. 23.

(From Our Special Correspondent.)

Iron Ore.—Concerning ore there is very little of a definite character to report, The Bessemer Ore Association has held a number of meetings, and while it is definitely agreed that the price of ore will be advanced this year the actual advance has not yet been made. There is no doubt, however, but that there will be a definite agreement entered into on the price of standard bessemer ores, placing them upon a somewhat higher schedule than that occupied last year. There is no gainsaying the fact that the iron ore companies have not had their share of the profits which have attended the manufacture of iron and steel during the past few years. This is so well recognized that there will be no protest whatever from the furnaces if standard bessemer is advanced even more than 25c. per ton . Of course, the non-bessemer ores will also be advanced, but the agreement will, and not in writing, as will be the case with the bessemers. The producers of Mesabi ores are also determined to come into their own. There has always been a sort of embargo upon this ore which has not been warranted by the physical properties attaining to the output of the later mines. The Mesabi producers expect that in the future a Mesabi ore whose physical and chemical properties are equal to the Old Range ores shall bring an equal price in the market. Another great division of labor in the production of iron and steel has also not had its share of profits during the past two or three years, and that is the ore-carrying vessels on the gerat lakes. Last year the contract rate, which held from the beginning of the season until its close, was 75c. per ton. At this rate the little chaps, say, the 2,500 to 3,000-ton class of vessels, did not make over 5 per cent, and the big fellows did not make over 10 per cent. Shippers are willing to pay a somewhat better rate this year ,and will not require much concerted action on the part of vessel men to put the rate at 85c. An advance in rates is absolutely essential, as operating expenses are going to be higher this year. Wages upon the Steel Corporation's vessels have already been advanced 10 per cent over those of last year.

Pig Iron.—Some of the furnaces of the United States Steel Corporation have had to shut down a day or two at a time for want of fuel. The Lorain Steel Company (subsidiary of the Steel Corporation) closed on Friday last for want of it, but is expected to resume this week. The coke situation is really worse than ever, and furnaces have to contract for four times as much as they want in order to get enough to keep them going. The relief which the railways were beginning to experience from the freight congestion was entirely obliterated by the storms which swept the northern half of the country. Premiums for prompt delivery, which were offered this week, could not tempt local furnaces, as they were all sold out to contract customers. Southern Ohio iron is coming in continually, and with reasonable promptness, but delivery from the Birmingham District is very, very slow indeed. The basic iron market is sold up, and there is practically nothing doing in it, either for spot shipment or future delivery. Prices, f. o. b. Cleveland, for shipments in the first half of 1903, are: Bessemer, $21.85@$22.35; No. 1 strong foundry, $23@$23.50; No. 2, $22.50@$23; No. 3 foundry, $21.75@$22.25; Scotch No. 1, $23@$23.50; Scotch No. 2, $22.50@$23; gray forge, Valley, $20@$20.75; Lake Superior charcoal, $26.50@$27.50.

Finished Material.—On galvanized sheets the mill sales in car-load lots, Cleveland, are quoted as follows: Nos. 10 and 11, 2.60c.; Nos. 12-14, 2.70c. to 2.85c.; Nos. 18-21, 3c. to 3.15c.; Nos. 22-24, 3.30c. to 3.45c.; Nos. 25-26, 3.55c. to 3.70c.; No. 27, 3.80c. to 3.95c.; No. 28, 4.05c. to 4.20c.; No. 29, 4.45c. to 4.60c.; No. 30, 4.95c. to 5.10c. The demand for structural steel continues firm, and small mills are getting premiums for immediate delivery.

Philadelphia. Feb. 26.

(From Our Special Correspondent.)

Pig Iron.—There is very little evidence of the activity in pig iron in this territory, which reports say exists in some other markets. Consumers here are willing enough to buy when prices and quality suit, but they are not anxious. They are watching the course of the market, and are awaitng a favorable turn. Many of them believe that the condition which they have been anticipating will come about which will enable them to make their customary early spring purchases on at least as favorable rates as last autumn. To all outward appearances the tendency in prices is upward, but most of our consumers insist that the influences beneath the surface are working prices in the opposite direction. The weather has been against dealings in pig iron and the office men have nothing of special interest to report. Quotations are everywhere firmly adhered to. To the disinterested outsider and market reporter it would appear that the advantage is decidedly with the pig iron makers. Quotations for the best No. 1 foundry are $24.50; No. 2, $22.50; No. 2 plain, $22; gray forge, $20, though a few makes are held at $20.50; basic iron is quoted at $20.50, with a chance of reaching $21; No. 3 Middlesboro is quoted at $21 at retail, delivered; no quotations given for cargo lots. Scotch is quoted at $23; bessemer, cargo lots, $20; low phosphorus, $22.

Billets.—The only business heard of this week was in special kinds ranging from $33 to $35, which does not indicate the price of regular stock. It is supposed that $32.50 is a fair quotation; for foreign billets as high as $29 is now quoted. A number of consumers have about concluded to place their orders, and in one or two cases business was under $27.

Plates.—The old story is again repeated. The only feature this week is that the smaller buyers have precipitated a lot of business into the market. Buyers generally are showing anxiety to get their requirements covered. Flange iron is 2.15c.; fire-box, 2.25c.; marine, 2.35c.; tank iron in small lots, 2.15c.

Structural Material.—The reason why certain large contracts for structural material which were to have been placed two or three weeks ago have not been placed is that the deliveries called for interfere with deliveries already arranged for during the same time. Quotations for angles are in a small way, 2.50c.

Steel Rails.—Steel rails are quoted at $28, and there are inquiries for grinder rails, which if placed will strengthen the market a good deal.

Old Rails.—Old steel rails are $21; old iron rails have been quoted at $25 in response to inquiry. Buyers are trying to get taken care of at $23.50.

Scrap.—Nothing whatever is being done in scrap this week. Brokers simply re-affirm quotations, which for heavy steel scrap is $20.50 to $21; railroad scrap No. 1 wrought, $24; wrought turnings, $17; machinery scrap, $20; there is no interest taken at present in any other kind.

Pittsburg. Feb. 24.

(From Our Special Correspondent.)

The severe weather has increased the difficulties of coke deliveries, and as a result a number of furnaces are banked in addition to those that were forced out over a week ago. Conditions seem more favorable now, but railroads are not guaranteeing shipments. The situation was serious in the Valleys last week, and fancy prices were offered for prompt coke. As high as $7.50 a ton at the ovens was paid, as coke was needed to prevent furnaces from chilling. The United States Steel Corporation was not able last week to move enough coke for its own ovens. These irregularities in shipments are adding greatly to the cost of pig iron production. To bank a furnace with coke at $6 and $7 a ton is a heavy expense; but outside of this the cost of pig iron during the year will be much in excess of last year. Furnaces are paying on an average $4 to $4.50 a ton for coke, against from $2 to $2.25 a year ago. Freights are higher, and fully $1 a ton is to be added for ore. A meeting of the executive council of the National Association of Blast Furnace Workers and Smelters is scheduled to be held in Youngstown to-morrow. Some of the principal leaders of the American Federation of Labor have been invited to attend, and while the object is not announced it is believed preparations are to be made for another demand for the introduction of the three-turn system, which furnacemen say is impossible. A wage advance would still further increase the cost of production, and the indications are that the price of pig iron will be higher before the end of the year. There have been no sales this week, but during the last days of the week several thousand tons were sold at firm prices. It is reported here that the base prices for the different grades of iron ore for the season have been practically fixed and are as follows: Old Range bessemer ore, $4.50; Mesabi bessemer, $4; Old Range non-bessemer, $3.60; Mesabi non-bessemer, $3.25. This is an advance of 25c. on Old Range bessemer and 75c. on Mesabi bessemer, compared with last season's prices. The Mesabi ore is increasing in favor, and the demand for it is greater than in former years. The indications are that 30,000,000 tons of ore will be brought down the coming season.

The market for finished steel products continues active, particularly in structural shapes, plates and merchant steel bars. The United States Steel Corporation is crowded with orders for pipe, and is getting behind in deliveries. The National works at McKeesport were closed for three days last week on account of a shortage in the supply of coke. New business in structural material is being offered almost daily. The Carnegie Steel Company is making an estimate on the structural steel for a skyscraper, which will require about 10,000 tons. The steel rail business for the entire year has been practically done, orders for small lots only coming in. The Lackawanna plant at Buffalo, which was to have been ready to operate on rails at the opening of the year, will not be in shape to start for several months. There is now no doubt as to the intention of the Jones & Laughlin Steel Company to engage in the steel rail production on a large scale. Official announcement was made that a rail mill to cost $2,000,000 will be built on property recently acquired. The company will also add to its production of finished steel by building mills to cost $1,000,000. For these improvements two blocks of property adjoining the present mill holdings have been bought. The new rail mill will be arranged so that it can be operated on rails, billets or bars. The rail capacity will be about 2,000 tons a day.

Pig Iron.—Bessemer pig iron for prompt delivery is held at $21.50@$22, Valley furnaces, and for second half $21 is quoted. A few small sales have been made, based on these prices. Foundry No. 2 is quoted this week at $22.50@$23, Pittsburg, according to delivery. One sale of 600 tons was made during the week at $22.25, Pittsburg, for second half delivery. Basic iron is scarce and Valley furnaces are quoting the same price as on bessemer. Virginia grades are held at $21, Pittsburg. Gray forge is a trifle more active. A lot of 3,000 tons was sold at $21, Pittsburg, for delivery before June 1.

Steel.—Bessemer steel billets are held at $30, the market being quiet, but open-hearth billets are strong. Sales aggregating 5,000 tons were made at $32. About 8,000 tons of steel bars sold during the week at the base price of 1.60c., and probably 10,000 tons of plates sold at the same figure.

Sheets.—The sheet market is gaining in strength and the few independent mills that are running report a better business. The leading producer continues to quote No. 28 black sheets at 2.75c., and galvanized at 75 and 10 per cent off.

Ferro-manganese.—There is no change in prices, domestic 80 per cent still being quoted at $50.

BY TELEGRAPH.

February 26.—An unexpected advance of $2 per ton has been ordered on all wire products.

New York. Feb. 26.

Pig Iron.—The local market is more active. We quote for early delivery, Northern irons at tidewaetr: No. 1X foundry, $23.25@$23.75; No. 2X, $22.25@$22.75; No. 2 plain, $21.25@$21.75. For Southern iron on dock, New York: No. 1 foundry, $23.75; No. 2, $22.75; No. 3, $21.75.

Plates.—Western mills are reported taking contracts in this territory at less than prices quoted by Eastern mills. We quote for tidewater delivery in car-loads: Tank, ¾-in. and heavier, 2.10c.; flange, 2.20c.

Cartagena, Spain. Jan. 24.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments for the week were two cargoes, 4,450 tons, dry ore and one cargo, 2,840 tons manganiferous ore, to Great Britain; one cargo, 6,700 tons magnetic ore, to Rotterdam. This makes a total of 37,110 tons for the year to date. The first three weeks of the new year have shown the local iron ore market to be generally in a good condition, although so far we have not been able to ascertain the existence of any large contracts which would guarantee production and business for some time to come. A large number of sales have undoubtedly taken place, but these seem rather to be due towards speculation in freights and not to an increased demand for iron ore. In several cases cargoes have been bought and shipped to be stored at the other end for sale later on when tonnage is unobtainable at present low rates. Meanwhile the local miners see a big immediate demand with the result that the quotations at the mines are in all respects strong. The largest cargo of iron ore shipped from this port is at present being loaded by the steamer *Epsom*. This vessel is carrying about 6,700 tons of Calasparra iron ore for Rotterdam.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 3d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 11s. 3d. per ton. No shipments are reported for the week. Other shipments were 300 tons copper pyrites to France.

CHEMICALS AND MINERALS.

(See also prices-current on page 356.)

New York, Feb. 24.

There is little new business outside of deliveries on contracts; but there are evidences that prices will advance rather than decline.

A fairly large export trade has been done through the port of New York last month. Of the more important articles we note $11,334 worth of asbestos, chiefly for Belgium and Austria; $10,291 of acids, $35,600 zinc dross to England, 6,305 bbls. cement, and 117,342 lbs. pot and pearl ashes, principally to England.

Imports at New York in January included 2,396 lbs. aluminum sulphate, 30,003 lbs. ozokerite, 24,610 lbs. mica, 103,850 lbs. prussiate of potash, 110,000 lbs. talc, 2,250 lbs. bismuth, 20,790 lbs. lithophone and 83,245 lbs. zinc oxide. Germany and France were the chief suppliers.

The so-called gypsum trust, known as the United States Gypsum Company, capitalized at $7,500,000, and consisting of 35 different producers, reports for the 11 months it has been in operation a net profit of $279,136. The gross profit was $336,279, from which there was spent for betterments and improvements $57,143. These profits fall far short of the estimate made when the combination was floated in December, 1901.

Cyanide of Potassium.—Producers are still well supplied with cyanide, and are inclined to believe better prices are nearing. Just at present the market is easy at 20 to 21½c. per lb., f. o. b. New York, for large orders. In Great Britain makers quote f. o. b. shipping port, 8¾d. (17½c.).

Heavy Chemicals.—Rail shipments are being delayed, not only by the heavy movement in other freight, but also by the recent storms. A few new orders for next fire alkali and caustic soda are noted at quotations below. Export business in bicarb. soda is looking up, and recent shipments included 1,000 bags to Japan, 300 kegs to Belgium, and 800 kegs to Great Britain.

Phosphates.—The trade hears again of a coming agreement among the hard rock miners in Florida, but until J. Buttgenbach & Co., and one or two of the other important operators express a willingness to sign, the compact cannot be expected to succeed. Moreover, as nearly 62 per cent of the exports of phosphates from the United States is in Florida hard-rock, any agreement not supported by the leading miners will be broken by severe competition. The last attempt initiated by Ocala people, and which proved a failure, is still fresh in the memory of the trade. So, unless the initial steps in an agreement this time are taken by another coterie of miners, no serious attention is likely to be given to the matter. It might be better to devote every energy to the elimination of the speculative buying element by reducing the delivery period in contracts from two or more years to nine months or a season's supply. It is contended that superphosphate manufacturers would also be benefited by shorter time contracts, inasmuch as season cargoes for prompt shipment for some years past could be obtained at lower prices than was paid on long-time contracts for the same delivery. Undoubtedly the variation in ocean freight rates is partly responsible for this condition. At any rate, it would be preferable for manufacturers to make contracts f. o. b. instead of c. i. f., and thus get the benefit of any reduction in ocean freight rates. To cite, last year freight rates from Florida to Continental ports, which took 309,024 tons, or nearly 63 per cent of the hard rock exported, fluctuated between $2.40 and $3.72, or $1.32 per ton. In 1901 the rates were on an average 21c. higher, and fluctuated $1.25 per ton. These fluctuations naturally influenced the c. i. f. price while f. o. b. quotations seldom varied. Consumers of other phosphates abroad will also do well to consider this question, as they are affected in practically the same way.

	Domestic, Prompt.	F. o. b. works. Futures.	Foreign, Prompt.	F. o. b. New York. Futures.
Alkali, high-test in bags	$2½@85c.	72½@75c.	90@92½c.	.....
Caustic soda, high-test in bags	$1.90@$1.95	$1.65@$1.70	$1.90@$2.00	.....
Bicarb. soda, ordinary	$1.25	.....	$1.50@$1.60	.....
Bicarb. soda, extra	$3.00	.....	.....	.....
Sal soda	55c.	.....	67½c.	.....
Chlorate of potash	$7¼@$7½	$7@$7¼	$7½@$8	$7@$7¼
Bleaching powder, per quality	.....	$1@$1.20	$1.37½@$1.75	$1.20@$1.25

Acids.—Quiet. Blue vitriol continues to strengthen. In January the exports of blue vitriol from New York amounted to 948,436 lbs., of which 428,654 lbs. went to Italy, and 384,622 lbs. to Austria. A year ago the exports from this port were 1,564,294 lbs., showing a decrease in 1903 of 615,858 lbs., or nearly 40 per cent, due chiefly to the absence of shipments to Greece. The average value of the exports in January, 1903, was $3.46 per 100 lbs., which compares with $3.99 last year, showing a reduction of 53c.

Exports of copper sulphate from Great Britain in January were 3,446 long tons, as against 1,088 tons in the same month last year, showing an increase of 2,358 tons, or about 217 per cent. This growth has no doubt been favored by the lower prices this year, the average invoice value per ton being equivalent to $88.47, as against $100.71 in January, 1902; showing a fall of $12.24, or about 12 per cent.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity:

Blue Vitriol	$5.00@$5.12½	Oxalic com'l	$5.25@$5.50
Muriatic, 18°	1.50	Sulphuric, 50°, bulk, ton	13.50@15.50
Muriatic, 20°	1.60	Sulphuric, 60°	1.05
Muriatic, 22°	1.75	Sulphuric, 60°, bulk, ton	18.00@20.00
Nitric, 36°	4.37½	Sulphuric, 66°,	1.20
Nitric, 38°	4.75	bulk, ton	21.00@23.00
Nitric, 40°	5.00		
Nitric, 42°	5.37½		

Brimstone.—Imports recently have been on a large enough scale to satisfy consumers. Spot best unmixed seconds are nominal at $23 per ton ,while shipments are worth $22.25@$22.75, according to position. The foreign market is stronger, but as ocean freights are low, consumers here have not yet been affected.

Pyrites.—Consumption is good, and prices continue firm. Recently 2,075 tons Spanish iron pyrites arrived at New York. Larger arrivals are reported at Southern ports, and at Pensacola, Fla., the Virginia-Carolina Chemical Company will import within the next six or eight weeks about 40,000 tons Spanish iron pyrites. This concern is a very important manufacturer and consumer of fertilizer acid.

Quotations for pyrites are f. o. b. Mineral City, Va.: Lump ore, $5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, $5, and fines, $4.75. Spanish pyrites, lump, 12@13c.; fines, 10@11c. per unit, delivered at New York and other Atlantic ports. Spanish pyrites contain from 46 to 52 per cent of sulphur; American, from 42 to 44 per cent.

Nitrate of Soda.—The market continues firm, and what little spot is obtainable brings about $2 per 100 lbs. Nearby arrivals are quoted at $1.97½, and futures from $1.85 up, according to position.

Sulphate of Ammonia.—Imports at New York in January were 364,923 lbs., chiefly from Great Britain. Sellers ask $3.10@$3.12½ per 100 lbs. for good gas liquor for shipment.

In January shipments of phosphate rock from Charleston, S. C., were 7,577 tons, principally to Baltimore. This quantity shows an increase over last year. A charter is noted from Coosaw to Nantes, France, at 10s. 9d. ($2.58), February sailing, which is a slight reduction from last year.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)	$6.00@$6.50	6@6¾d.	$9.48@10.07
*Fla. land peb. (68@73%)	3.00@ 3.25	4¾@5d.	6.65@ 7.00
†Tenn., (78@82%) export	3.25@ 3.50	5½@6d.	8.58@ 9.36
†Tenn., 78% domestic	3.00 ...	.....	.....
†Tenn., 75% domestic	2.75@ 3.00	.....	.....
†Tenn., 73@74% domestic	2.30@ 2.40	.....	.....
†Tenn., 70@72% domestic	2.10@ 2.25	.....	.....
‡So. Car. land rock	...@ 3.25	4½@4¾d.	6.67@ 5.98
‡So. Car. river rock	2.75@ 3.00	.....	.....
Algerian (63@68%)	.....	4½@4¾d.	5.85@6.18
Algerian (58@63%)	.....	4¼@4½d.	5.10@5.40
Algerian (53@58%)	.....	4⅛@4⅜d.	4.62@4.90

* Fernandina, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. Feb. 11.

(Special Report of Joseph P. Brunner & Co.)

There has been a further advance in sulphate of copper, and sales have been made at £23 per ton, less 5 per cent. The difficulty now is to find any sellers, makers being practically fully sold for the next few months, while beyond an odd parcel or two there is nothing offering by resellers. There are a number of large inquiries in the market, which cannot be dealt with owing to the absence of sellers.

In ordinary lines of heavy chemicals there is a fair trade going on, but there is nothing of special interest to report.

Soda Ash.—Firm. For tierces, the nearest range is as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash; ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash; bags, 5s. per ton under price for tierces.

Caustic Soda.—Firm and demand good. We quote: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent, and a few other export quarters.

Bleaching Powder.—Rather dull, buyers being apparently full up on contracts, For hardwood, prices are nominally about £4 7s. 6d.@£4 10s. per ton, net cash, but quotations depend upon market.

Sulphate of Ammonia.—Well maintained at £12 15s. @£12 17s. 6d. per ton, less 2½ per cent for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda.—Selling to a fair extent on spot at £9 7s. 6d.@£9 10s. per ton, less 2½ per cent for double bags, f. o. b. here, as to quality.

METAL MARKET.

New York, Feb. 26.

Gold and Silver Exports and Imports.

At all United States Ports in January and Year.

Metal	January. 1902.	January. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$1,973,675	$77,143	$1,973,675	$77,143
Imports	1,405,787	1,787,847	1,405,787	1,787,847
Excess.	E. $567,888	I. $1,710,704	E. $567,888	I. $1,710,704
Silver:				
Exports	$4,524,010	$3,577,416	$4,524,010	$3,577,416
Imports	2,107,681	1,893,963	2,107,681	1,893,963
Excess.	E. $2,416,329	E. $1,683,453	E. $2,416,329	E. $1,683,345

Gold and Silver Exports and Imports, New York.

For the week ending February 24, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week	$456.655	$221,277	$295 250	$15,594	E. $515,043
1903	740.933	894.525	3.090.662	142,205	E. 2,794,865
1902	7,284.630	306.872	7.781.225	234.100	E. 14,524,989
1901	9,021,340	358,429	6 080.545	662,122	E. 13,881,334

The gold and silver movement was chiefly with Europe and the West Indies.

Financial Notes of the Week.

There is no change to be noted in general business, and the speculative markets have been rather quiet. Money continues in moderate supply, and nothing further of a definite nature has been heard about the gold export. There is still, however, a general expectation that more or less gold will be sent out within a short time.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending February 21, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$911,800,900	$936,757,600	$950,208,700
Deposits	1,009,186,900	1,019,474,200	963,219,300
Circulation	31,225,000	31,174,300	43,191,800
Specie	192,953,200	194,898,900	180,772,000
Legal tenders	73,890,200	72,426,300	69,074,500
Total reserve	$266,843,400	$267,325,200	$249,846,500
Legal requirements	252,296,725	254,868,550	240,804,825
Balance surplus	$14,546,675	$12,456,650	$9,041,675

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings on the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$194,898,900	.....	$180,772,000	.....
England	187,548,970	.....	177,254,985	.....
France	499,776,865	$221,077,280	505,287,070	$219,594,530
Germany	197,255,000	72,975,000	170,290,000	62,985,000
Spain	70,220,000	87,300,000	72,135,000	99,400,000
Neth'l'ds	28,654,000	32,345,500	23,489,500	32,831,000
Belgium	15,416,665	7,708,335	15,880,000	7,940,000
Italy	79,595,000	10,612,000	86,545,000	10,892,000
Russia	355,470,000	35,515,000	384,975,000	37,715,000

The returns of the Associated Banks of New York are of date February 21 and the others February 19, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has been steady to firm. London reports that near silver is scarce, and that offerings are somewhat smaller. The future, in their judgment, depends on the action of the India Council. This expression of views does not take into account the possibility of demand for the Philippines this year, should Congress authorize purchases for coinage for those islands as seems most probable.

The United States Assay Office in New York reports receipts of 103,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to February 12 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.
India	£1,005,320	£986,800	D. £18,520
China	11,500	91,500	I. 80,000
The Straits	.....	58,508	I. 58,508
Total	£1,016,820	£1,136,808	I. £119,988

Receipts for the week were £157,000 in bar silver from New York, £4,000 from the West Indies, and

£11,000 from Australia; total, £172,000. Shipments were £73,000 in bar silver to Bombay, £10,000 to Calcutta, £2,500 to Madras, £7,726 to the Straits, and £10,000 to China; total, £103,226.

Indian exchange has been strong and all the Council bills offered in London were taken at 16.06d. per rupee. Silver has been in more demand on Indian account than for some time past. Reports from that country indicate that the coin reserves are being drawn rather low, and there is a general expectation that purchases of silver for coinage purposes will be required before long. The speculative interest in London is making the best of this anticipation.

The foreign merchandise trade of Great Britain in January is valued by the Board of Trade returns as follows:

	1902.	1903	Changes.
Imports	£50,142,348	£46,226,515	D. £3,915,833
Exports	29,609,620	30,971,354	I. 1,361,734
Excess, imports	£20,532,728	£15,255,161	D. £5,277,567

The movement of gold and silver for the month is reported as follows:

	1902.	1903	Changes.
Gold:			
Imports	£1,418,926	£1,469,504	I. £50,578
Exports	1,116,880	1,206,787	I. 89,907
Excess, imports	£302,046	£262,717	D. £39,329
Silver:			
Imports	959,504	876,628	D. 82,876
Exports	887,890	1,082,391	I. 194,501
Excess	I. £71,614	E. £205,763	.....

Of the silver imported this year £755,812, or 86 per cent, comes from the United States.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$.38	$.39½
Peruvian soles and Chilean pesos	.37	.39
Victoria sovereigns	4.86	4.88
Twenty francs	3.86	3.88
Twenty marks	4.74	4.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

February	Sterling Exchange	Silver N. Y. Cts.	Silver London, Pence.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton.	Tin, Cts. per lb.	Lead Cts. per lb.	Spelter N. Y. Cts. per lb.	Spelter S. L. Cts. per lb.
				12¾	12¾			4.05		
19	4.87⅜	48⅛	22 1/16	@13	@12⅞	57½	29⅜	@4.10	5.05	4.85
				13	12⅞			4.05		
20	4.87⅜	48¼	22¼	@13¼	@13	57⅜	29½	@4.10	5.05	4.85
				13	12⅞			4.05		
21	4.87⅜	48	22⅛	@13¼	@13	....	29½	@4.10	5.05	4.85
23	.....	...	22⅛	...	.....	58⅛	.....	....	....	.....
				13	13			4.05		
24	4.87⅜	48¼	22¼	@13¼	@13⅛	58¾	29½	@4.10	5.05	4.85
				13⅛	13			4.05		
25	4.87⅜	48¾	22 1/16	@13¼	@13⅛	59¼	29¾	@4.10	5.05	4.85

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper.—During the week under review the market has again displayed considerable strength. Stimulated by the firm reports from abroad, prices on our side responded quickly, and at the close we quote Lake copper at 13⅛@13¼c.; electrolytic in ingots, cakes and wirebars at 13@13⅛c.; in cathodes at 12¾@12⅞c.; casting copper at 13c.

The market for standard copper in London, which closed last week at £57 17s. 6d., opened on Monday at £58 2s. 6d., and the closing quotations on Wednesday are cabled as £59 5s.@£59 7s. 6d. for spot; £59 7s. 6d.@£59 10s. for three months.

Refined and manufactured sorts we quote: English tough, £61@61 10s.; best selected, £62 10s.@£63; strong sheets, £72 10s.@£73; India sheets, £69 10s.@£70 10s.; yellow metal, 6¾d.

Exports of copper from Atlantic ports in the week ending February 24, are reported by our special correspondents as follows: Great Britain, 745 long tons; Germany, 5; Holland, 190; Belgium, 150; Italy, 6; total, 1,096 tons.

Imports of copper into Great Britain and re-exports of foreign copper, for the month of January, were as follows, in long tons; the totals giving the estimated quantity of fine copper:

	1902.	1903.	Changes.
Copper ore	16,348	12,024	D. 4,324
Matte and precipitate	7,200	5,543	D. 1,657
Fine copper	9,044	3,956	D. 5,088
Totals, fine copper	12,644	7,930	D. 4,714
Re-exports	2,026	1,122	D. 904
Balance	10,618	6,808	D. 3,810

Of the imports this year 20 tons of ore, 425 tons of matte and 801 tons fine copper were from the United States; against 1,258 tons matte and 5,202 tons fine copper last year.

Tin has ruled very steady indeed throughout the week, the variations being very small. Prices ruled at about 29½c., until towards the close, when a somewhat firmer tendency was noticeable and 29⅝c. was paid.

The foreign market, which closed last week at £133 5s., opened on Monday at £133 17s. 6d., declined on Tuesday to £132 15s., but reacted again on Wednesday, and the closing quotations are cabled as £133 12s. 6d.@£133 15s. for spot; £134 12s. 6d.@£134 15s. for three months.

Imports and exports of tin in Great Britain for the month of January are reported as follows, in long tons:

	1902.	1903.	Changes.
Straits	1,690	2,148	I. 458
Australia	399	437	I. 38
Other countries	463	155	D. 308
Total	2,552	2,740	I. 188
Exports	1,678	2,308	I. 630
Balance	874	432	D. 442

The business in tin for the month was much lighter than usual.

Lead remains quiet but steady, with quotations unchanged at 3.95@4c., St. Louis; 4.05@4.10c., New York.

The foreign market continues to advance, Spanish lead being quoted at £12 3s. 9d.@£12 5s.; English lead, £12 6s. 3d.@£12 7s. 6d.

Imports and exports of lead in Great Britain for the month of January were as follows, in long tons:

	1902.	1903.	Changes.
United States	4,797	3,050	D. 1,747
Spain	8,987	7,301	D. 1,686
Australia	7,917	5,853	D. 2,064
Other countries	1,145	1,499	I. 354
Total imports	22,846	17,703	D. 5,143
Exports	2,253	2,036	D. 217
Balance	20,593	15,667	D. 4,926

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is firm at 3.97½c.@4c. for Missouri brands, while argentiferous lead is selling at 4c.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 7, that the price of silver for the week has been 11.50 reales per ounce. Exchange has gone up by 7 centimos, making it 33.50 pesetas to £1. The local quotation for pig lead on wharf has been 60.75 reales per quintal, which, on above exchange, is equal to £10 2s. 10d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports for the week included 406,000 kgs. to London and 467,980 kgs. to Marseilles; a total of 873,980 kgs. pig lead. There was also exported 1,035 kgs. silver bars to Marseilles.

Spelter is in very good demand, and a large business has taken place for prompt as well as future delivery. At the close we quote 4.85@4.87½c., St. Louis; 5.05@5.07½c., New York.

The foreign market is also firmer, good ordinaries being quoted at £21@£21 5s.; specials, £21 5s.@£21 10s.

Imports of spelter into Great Britain in January were 6,900 long tons, against 7,315 tons in January, 1902; a decrease of 415 tons this year.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is strong, with a fairly active demand. Sales are made at 4.85c. for both spot and future deliveries.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 7, that there is quite a boom in zinc-blende ore and the London price of spelter seems in sympathy with the high prices at the mines. The production of some of the most important mines having been sold for February at 1¼ reales higher than the prices for January, mine owners refuse to quote for March production. Exports for the week were 3,450 tons zinc-blende to Antwerp.

Antimony remains quiet but steady. We quote Cookson's at 8¼c.; Hallett's, 7c.; Italian, French, Japanese, Hungarian and U. S., at 6⅝@6¾c.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Quicksilver.—The New York price is $47 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is $45.50 @$46.50 per flask for domestic orders, and $43@$43.50 for export. The London price is £8 12s. 6d. per flask, with the same quotation from second hands.

Imports of quicksilver into Great Britain in January were 51,168 lbs., against 39,675 lbs. in January, 1902, an increase of 11,493 lbs. The re-exports for the month were 64,380 lbs., against 214,448 lbs. in 1902. This shows 13,212 lbs. taken from stocks this year, and 174,773 lbs. in 1902.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum.	Per lb.		Per lb.
No. 1, 99% ingots	33@37c.	Ferro-Tungsten (37%)	28c.
No. 2, 90% ingots	31@34c.	Magnesium	$2.75
Rolled Sheets	4c. up	Manganese, pure (N.Y.)	60c.
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$1.50	Molybdenum (Best)	$1.82
Chromium, pure (N.Y.)	80c.	Phosphorus	45c.
Copper, red oxide	50c.	American	70c.
Ferro-Molyb'um (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanum (20@25%. N. Y.)	55c.		

Missouri Zinc Ore Market. Feb. 21.

(From Our Special Correspondent.)

The output for the week is estimated at fully 60 per cent less than an average, owing to a blizzard that greatly retarded work. There was a scarcity of ore and a larger amount was sold on a basis of $33 per ton for 60 per cent than during the previous week. The highest price paid, however, was $36 per ton in the bin, as no ore assaying over 63 per cent was marketed. The Joplin shipments were more than those from any other camp. The price of lead remains steady at $51 per ton, delivered. The car situation shows little promise of improving, and some buyers had to load open coal cars again. During the corresponding week of last year the highest price paid for zinc was $31.50, and for lead $43.50 per ton.

Following are the shipments of zinc and lead ores from the various camps for the week ending February 21, 1903:

	Zinc lbs.	Lead lbs.	Value.
Webb City-Carterville	1,113,800	333,820	$25,691
Joplin	1,174,470	78,510	20,793
Duenweg	630,250	15,930	10,482
Carthage	627,920	.....	10,047
Galena-Empire	590,570	37,390	9,616
Aurora	399,610	10,930	6,340
Oronogo	240,590	.....	3,992
Carl Junction	221,550	.....	3,656
Central City	40,580	26,690	1,229
Granby	66,000	.....	1,056
Alba-Neck	63,220	.....	1,012
Badger	65,930	.....	923
Mitchell	43,470	.....	686
Zincite	30,160	.....	483
Spurgeon	44,380	2,580	420
District total	5,352,500	505,850	$96,326
Total 8 weeks	66,565,140	8,121,060	$1,231,499

Zinc value, last week, $83,527; lead value, $12,799; zinc value 8 weeks, $1,025,570; lead value, $205,929.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	....	24.07	....	4.075	....	4.15
March	....	26.32	....	4.075	....	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	.....	12.173	.....	12.378	....	55.16
March	.....	11.882	.....	12.188	....	53.39
April	.....	11.618	.....	11.988	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.490	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.08
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.628	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.07	62.82
February	....	....	25.41	55.09	28.13	61.06
March	....	....	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†Ala. Coal & Iron, pf...	Mar. 1	1.75	43,750	612,500
§Am. Coal	Mar. 2	1.25	75,000	1,357,500
†Am. Steel Fdrs., pf.	Mar. 2	1.50	232,500	465,000
C. & K. & N., Colo.	Mar. 2	.01	14,319	28,638
†Camp Bird, Colo.	Mar. 2	.15	110,700	332,100
†Calumet & Hecla	Mar. 10	5.00	500,000	80,350,000
*Cinco Senores, Mex.	Feb. 28	3.82	7,640	671,385
Col. & Hock. Coal & Iron.	Mar. 1	.50	35,000	35,000
*Con. Mercur, Utah	Mar. 9	.03	30,000	940,000
†General Chem., com.	Mar. 1	1.00	74,103	1,004,124
†Gen'l Chem., com.	Mar. 10	1.25	92,629	1,022,650
Last Dollar, Colo.	Mar. 3	.02	30,000	210,000
†National Carbon, pf.	Feb. 15	1.75	78,750	1,338,750
†National Lead, pf.	Mar. 16	1.75	260,820	13,187,708
†Ohio & Indiana Gas.	Mar. 3	1.00	90,000	1,170,000
§Phila. Gas, pf.	Mar. 1	1.25	99,959	906,108
†Republic I. & St., pf.	April 1	1.75	356,246	5,531,439
†Standard Oil	Mar. 16	20.00	19,400,000	183,435,000
†Trimountain Cop., Mich.	Mar. 10	1.50	150,000	150,000
Trinity County, Cal.	Mar. 2	.05	5,000	15,000
Va.-Car. Chem., com.	Mar. 1	1.25	349,805	3,329,064

*Monthly †Quarterly. §Semi-annual.

ASSESSMENTS.

Name of Company.	Location. No.	Delinq.	Sale.	Amt.
American	Utah 2	Mar. 6	Mar. 25	.01
Andes	Nev. ..	Feb. 16	Mar. 13	.10
Burton	Utah 1	Mar. 18	Apr. 3	.001
Chollar	Nev. 61	Feb. 18	Mar. 12	.05
Con. Cal. & Va.	Nev. 18	Feb. 18	Mar. 11	.25
Crown Point	Nev. 88	Feb. 25	Mar. 18	.10
Free Silver	Utah ..	Feb. 23	Mar. 21	.00¼
Jenny Lind	Cal. 16	Feb. 22	Mar. 12	.01½
Justice	Nev. ..	Mar. 6	Mar. 27	.10
Little Chief	Utah 15	Mar. 10	Mar. 28	.01
Marina Marsicana	Cal. 34	Mar. 9	Mar. 30	.02
May Day	Utah 1	Mar. 7	Mar. 25	.01½
Mexican	Nev. 78	Feb. 25	Mar. 19	.10
Potosi	Nev. 65	Feb. 11	Mar. 4	.05
Savage	Nev.109	Mar. 5	Mar. 26	.10
Sierra Nevada	Nev.128	Feb. 25	Mar. 16	.10
Tanana	Cal. 6	Feb. 2	Mar. 2	.10
Tetro	Utah 25	Feb. 28	Mar. 21	.02
Union Con.	Nev. 66	Mar. 10	Mar. 30	.10
Wabash	Utah ..	Feb. 21	Mar. 12	.05
Wellington Oil	Cal. ..	Mar. 10	.....	.02
West Century	Utah ..	Mar. 7	Mar. 31	.01
Yellow Jacket	Nev. 13	Feb. 11	Mar. 19	.10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Feb. 18. H.	Feb. 18. L.	Feb. 19. H.	Feb. 19. L.	Feb. 20. H.	Feb. 20. L.	Feb. 21.† H.	Feb. 21.† L.	Feb. 23.* H.	Feb. 23.* L.	Feb. 24. H.	Feb. 24. L.	Sales
Acacia, Colo	$1			.08½								.08		3,500
Alice, Mont.	25	.35		.35		.40	.36					.45		1,500
Amalgamated c., Mont	100	74	72⅝	73¾	71	73¼	72					74½	72½	216335
†Anaconda c. Mont.	25	123½	121	120⅝	118	120	117½					122½	119⅝	9,200
Anaconda Gold, Colo.	5													
Belcher, Nev.	3													
Best & Belcher, Nev.	3			2 15										100
Breece, Colo.	25						.66							300
Brunswick, Cal.	1					.00								500
Caledonia, Nev.	2½	2.10												500
Catalpa, Colo.	1	.07	.00¾											200
Chollar, Nev.	3					.39								300
Comstock T., s., Nev.	2	.11	.10	.08⅝	.08½	.11	.10½					.12		16,700
Comst T Bonds	100					.08¾	.08¼					.09	.08½	29,700
Con. Cal. & Va., g. s. Nev	2½	2.30		2.25										1,600
Creede & C. C., Colo.	1													
Cripple Creek c., Colo.	1					.06½								1,000
Daly, Utah	20	5.00												1,000
Dunkin, Colo.	1													
Elkton g., Colo.	1					.40	.39							500
Gould & Curry, Nev.	3			.55										200
Greene Con., c., Mex.	10	25.00	24.25	25.00	23.38	24.75	23.75					26.00	24.75	37,650
Hale & Norcross, Nev	3			1.05										300
Horn Silver, Utah	25													
Isabella, g., Colo.	1	.24		.23										1,000
Jack Pot, Colo	1			.13								.13		700
Julia, Nev.	1					.07						.08		1,500
Justice Nev.	1					.15	.10							2,000
Mollie Gibson, Colo.	5													
Moon-Anchor, Colo.	5			.12										1,000
Moulton, Mont.	25													
Ontario, Utah	100			7.00	6.75	7.00						6¼	6⅜	500
Ophir, s., Nev	1	2.30	2.25	2.25		2.20						2.10		800
Pharmacist, Colo.	1	.05½												1,600
Phoenix, Ariz.	1													
Portland, Colo.	10	1.50		1.55	1.50							1.55	1.50	800
Potosi, Nev.	3	.60										.55		500
Quicksilver, Cal.	100	3.00												50
Sierra Nevada, Nev	3													
Tenn. c., Tenn	25	31.00	30.00	31.00	30.38	30.50	30.00					30.50	29.50	7,600
Union Con., Nev.	2½													
Union Cop., N. C.	10	3.13	3.00	3.13	3.00	3.00						3.00		1,800
White Knob, g. s., Ida	100	13.50	12.75			12.63	12.50							355
Work, Colo.	1											.08		1,000
Yellow Jacket, Nev.	3					.53	.52							300

*Holiday. †Per Cent. Total sales 341,390 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Feb. 18. H.	Feb. 18. L.	Feb. 19. H.	Feb. 19. L.	Feb. 20. H.	Feb. 20. L.	Feb. 21.† H.	Feb. 21.† L.	Feb. 23.† H.	Feb. 23.† L.	Feb. 24. H.	Feb. 24. L.	Sales.
Adventure Con., c.	$25	100,000			15	14¾	14¾	14½					14¾	14½	682
Allouez	25	80,000	6½	6⅛	6⅛	6	6¼	6							4,368
Amalgamated, c.	100	1,538,879	74⅛	72¾	73⅝	71¾	73⅝	71¾					74¼	72½	36,748
Am. Z. L. & Sm.	25	60,000					11	8¾					11⅛	10¾	2,361
Anaconda, c.	25	1,200,000											30⅛	30	370
Arcadian, c.	25	150,000	6	5¼	5⅞	5⅝	5⅝	5½					5⅝	5½	5,820
Arnold	25	60,000													
Atlantic, c.	25	100,000	13		13	12⅜	12½						13	12⅜	1,350
Bingham Con., g. s.	50	150,000	38⅜	37½	37⅛	35⅜	37	36					36¼	36	4,494
Bonanza	10	300,000			.80										100
British Columbia	15	250,000											6¾		200
Cal. & Hecla, c.	25	100,000	540	537¾	530		530	525					525	520	241
Catalpa	10	300,000													
Centennial, c.	25	90,000	31¾	31	31¼	30	31¼	31⅛					31½	30½	8,892
Central Oil	25	60,050			7		7⅜	7							530
Cochiti	10	182,250			36										1
Con. Mercur, g.	5	1,000,000			1¾	1⅛	1¾	1⅝					1¾		1,100
Continental Zinc	25	22,000													
Copper Range Con.	100	285,000	75	73½	73⅝	71¼	73⅜	72					74	72½	11,550
Crescent	10	300,000													
Daly-West., g. s.	20	180,000	39		39	38⅝	39	38¾					40		755
Dominion Coal	100	150,000	129¼		128¾	127⅜	129								225
Dominion Coal, pf.	100	30,000	118¾												5
Dominion I & S.	100	100,000			54	50½	54	52							7,235
Elm River	12	100,000			3½										50
Franklin, c.	25	100,000			13	12½	12⅝	12					12¼	12	830
Guanajuato Con.	5	385,000													
Isle Royale Con., c.	25	150,000	15½		14½		15	14½							150
Mass Con., c.	25	100,000	16		15⅜	15¼	15⅜	15⅛					15⅜	15	650
Mayflower, c.	25	100,000			2¼		2¼	2					2¼	1⅞	285
Michigan, c.	25	100,000	11										10¾		175
Mohawk, c.	25	100,000	57¼	56½	56¼	54½	56	54½					55½	54½	4,908
Mont. Coal & Coke	25	200,000	6												70
Mont'l & Boston, c.	5	570,000	1⅞		1⅛	1⅜	1⅜						1⅛	1⅜	4,000
Old Colony, c.	25	100,000	2				2¼	2							200
Old Dominion, c.	25	150,000	23¼	22½	22		21¾	21¼					21⅜	21⅛	506
Osceola, c.	25	96,150	76¾	74½	75	74	75¼	74					75	74	1,811
Parrot, s. c.	10	229,850	33	32⅜	33¼	32½	32¼						33	32¾	645
Phoenix Con., c.	25	100,000	7⅛	7¼	7¼	6¾	7	6¾					6⅞	6¼	890
Quincy, c.	25	100,000	123	121									122	121½	51
Rhode Island, c.	25	100,000	3⅜		3¼	3							3		420
Santa Fe, g. c.	10	250,000	3	2⅞	3	2⅝							2¾		445
Shannon, c.	10	188,296	13¾	13	13	12⅞	13	12¾					13¼	12⅝	1,940
Tamarack, c.	25	60,000	184½	184	180		180						187	180	271
Tecumseh.	25	90,000			1¼	1							1¼	1	170
Tennessee	25	175,000					3½								100
Trimountain	25	100,000	106½	100	106	103	106¼	104					106¼	106	3,508
Trinity, c.	25	100,000	13½	13	13¼	12½	13¼	12¾					13¼	13	3,083
United Copper	100	450,000	29⅜												100
United States, g.	25	250,000	26¾	25¾	25½	25½	26¼	25⅝					26¼	25⅝	9,088
U. S. Coal & Oil.	25	240,000	15		15⅜	15	15⅜	15					15⅜	15	9,005
Utah Con., g.	5	300,000	32¼	31⅝	31¾	31	31½	31¼					31¾	31	5,415
Victoria, c.	25	100,000	8⅛	8¼	8¼	8	8¼						8	7⅞	1,165
Winona, c.	25	100,000	9¼	9	8¾	8¼	9	8¼					8¾	8	2,887
Wolverine, c.	25	60,000	70		70	69½	70	69½					70	69½	520
Wyandot	25	100,000	1⅞		1¾		1¾						1¾		800

* Boston Stock Exchange. †Holiday. Total sales, 141,111 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Feb. 18. H.	Feb. 18. L.	Feb. 19. H.	Feb. 19. L.	Feb. 20. H.	Feb. 20. L.	Feb. 21. H.	Feb. 21. L.	Feb. 23.‡ H.	Feb. 23.‡ L.	Feb. 24. H.	Feb. 24. L.	Sales
Allis-Chalmers, U. S.	100	21	20	23	22¼	22	21½					21½	21	2,725
Allis-Chalm's, pf., U.S.	100			87½	87	87								500
Am. Agr. Chem., U.S.	100	26	22	26	22	26	22							
Am. Agr. Chem. pf., U.S.	100	82		82		82								
Am. Sm. & Ref., U.S.	100	52¾	51	52⅝	51	51½	50⅜					52½	51½	23,250
Am. Sm. & Ref. pf., U.S.	100	98¾	98½	97¾	97½	98	96¾					97⅝	97½	4,160
Am. Steel & Fdy., U.S.	100	18		17½		17½						18		600
Am. S. & Fdy. pf., U.S.	100	69½										66		641
Col. Fuel & I., Colo.	100	76	74½	75	74⅜	75	74					75		4,450
Col. & H. C. & I., Colo.	100	22¼	21½	21⅝	21½	22	21½					21⅝	21¾	4,200
Crucible Steel, U. S.	100	20⅞	20⅜	20⅝		20⅞	20⅜					20⅛	20⅜	
Crucible Steel, pf., U.S.	100	86	85½	86	85¼	86	85⅜					8⅛	86	
†Mong. R. Coal, Pa.	100	11⅜	11⅜	11⅜	11⅜	11⅝						11¾		800
†Mong. R. Coal pf, Pa.	100	39¾	39⅜	39¾		39¾	39½					40¼	39¾	820
National Lead, U.S.	100	28		27½	27	28	27½					27½	27	2,100
National Lead pf, U.S.	100	94¼	94¼			94½	94¼					94		750
†Phila Nat. Gas	100					46½	46¾							14
†Phila Nat. Gas, pf.	100	48¾												
†Pittsburg Coal, Pa.	100	29¾	29½	29		29						29		3,600
†Pittsburg Coal pf, Pa	100	91¾	91½	91½	91	91¼						91½	91	508
Republic I & S., U.S.	100	22¾	21¾	22⅛	21¾	21⅞	21¾					22¼	21½	15,910
Republic I. & S., pf., U.S.	100	80⅜	79¾	80		79⅜	79⅛					80		3,450
Sloss-Shef S. & I., Ala.	100	71	70	70¾		70¾	70					72	70¾	2,500
Sloss-Sheff S. & I. pf, Ala.	100	97½	95¼											300
Standard Oil, U.S.	100	740	736	715§	710	736	733					716	708	62
Tenn. C. I. & R. R., Ala.	100	67¾	65¼	66½	65½	65⅞	64⅜					66	65	21,425
U. S. Red & Ref., U. S.	100	35												200
U. S. Red & R. pf., U.S.	100													
U.S. Steel Corp., U.S.	100	39½	38¾	38¼	38¼	38⅜	38¼					39⅜	38⅝	52,394
U.S. Steel Corp. pf, U.S.	100	88¾	88	88¾	87¾	88¼	87⅝					88⅜	88	33,276
Va.-Car Chem., U.S.	100	66¼	65¼	65§		66⅜	65⅝					65¼	64⅞	5,175
Va.-Car Chem. pf, U.S.	100	128½										128⅝		500
Va. I. C. & Coke, U. S.	100			38½		38						39⅛	38⅝	1,200
....														

* New York Stock Exchange. † Pittsburg Stock Exchange. Total sales, 526,970 shares. ‡ Holiday. § Ex-Dividend.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Feb. 16. H.	Feb. 16. L.	Feb. 17. H.	Feb. 17. L.	Feb. 18. H.	Feb. 18. L.	Feb. 19. H.	Feb. 19. L.	Feb. 20. H.	Feb. 20. L.	Feb. 21. H.	Feb. 21. L.	Sales
Acacia	$1	.10	.09¾	.10	.09⅝	.10	.09⅝	.10	.09⅝	.09¾	.09	.09¾	.09	3,000
Am. Con.	1	.02¾	.02⅝	.02⅝		.02⅝	.02⅜	.02⅝	.02½	.02⅝	.02	.02⅝	.02⅝	21,000
Anaconda	1	.19		.19		.19		.19		.19	.13	.13⅝	.15	
Ben Hur	1	.02⅞	.02	.02⅝	.02⅛	.02⅝	.02¼	.02⅝	.02⅛		.02	.02⅜	.02	
Blue Bell	1	.08	.07	.08	.07	.8	.07	.08	.07			.08		
C. C. & M.	1	.02½	.02	.02½		.02¼	.02	.02¼	.02	.02¼	.02½	.02		2,000
C. K. & N.	1	.20¾	.19¾	.20	.19	.19½	.18½	.19		.18	.17	.18¾	.17¼	11,000
C. C. Con.	1	.05½	.05¼	.05½	.05	.05⅜	.04⅞	.05¼		.05	.04¾	.05⅜	.05	2,000
Coriolanus	1	.03¼				.04	.02	.04						
Des Moines	1		.02½	.02¾	.02⅝	.02¾		.02¾		.02¾		.02¾		
Dr. Jack Pot	1	.10¾	.10⅜	.11	.10¾	.10¾		.10⅝	.10	.10⅝	.10	.12	.10	7,500
Elkton Con.	1	.38	.36	.37¾	.36	.37⅝	.37¼	.37½	.37¼	.39¼	.38	.39⅜	.38	2,700
El Paso	1	.68½	.67¾	.68	.67½	.67½	.67	.67½	.67	.67	.65	.65¼	.64½	4,700
Fannie Rawlings	1	.05		.05		.05	.04	.05	.04	.05½	.04⅜	.11	.09	
Findley	1	.11⅜	.10¾	.11¼	.10¼	.11⅜	.10¾	.11⅜	.10¼	.11	.10¾			5,000
Gold Dollar Con.	1			.05¾	.05½	.05½		.05½	.05¾	.05⅝	.05	.05⅝	.05¼	26,500
Gold King	1													
Golden Cycle	1	.80	.79	.80	.78¾	.78¾		.79¾	.78½	.80	.76	.79	.75¼	5,500
Golden Fleece	1	.20	.05	.20	.05	.20	.05	.20	.05	.20		.20	.05	
Gould	1	.04¾	.04½	.04¾	.04⅜	.04⅝		.04¾	.04½	.04⅝	.04¼	.04⅝	.04¼	14,000
Hart	1	.04	.02¾	.04	.02¾	.04	.02¾	.04	.02¾	.04	.02¾	.04	.02½	
Isabella	1	.23½	.23	.23	.23	.22¾	.23	.22¾	.22	.21¾	.21	.20¾	.20	26,000
Jack Pot	1	.12	.10	.12	.10½	.12	.10¾	.12	.10½	.12	.10¾	.12	.10¼	
Last Dollar	1	.65		.65		.65		.65		.65		.65		
Lexington	1	.05½	.05	.05½	.05	.05½	.04¾	.05½	.05	.05	.04¾	.04¾	.04¼	1,000
Little Puck	1	.03¾	.03½	.03¾	.03½	.03¾	.03	.03¾	.03	.03¾	.03	.03¾	.03	
Mollie Gibson	1		.06		.06	.07	.05¾	.10	.05½		.06		.06	
Moon Anchor	1	.11	.08½	.11	.08½	.11	.08	.11	.08	.10	.09	.10	.09	5,600
New Haven	1													
Pharmacist	1	.05	.04¾	.05	.04¾	.05	.04¾	.05	.04¾	.05	.04¾	.05	.04¾	8,000
Pinnacle	1		.04	.04¾	.04		.04		.04				.04	
Pointer	1	.01¾	.01	.01¾	.01	.01¾	.01¾	.01¾	.01	.01¾	.01¾	.01¾		16,000
Portland	1	1.47	1.39	1.50	1.40	1.42	1.38	1.42	1.38	1.45	1.40	1.43	1.40	4,000
Prince Albert	1	.03¼	.03¼	.03½	.03	.03¾	.03	.03¼	.03	.03¼	.03	.03¾	.03	11,000
Vindicator Con.	1	1.03		1.10	1.04	1.10	1.04	1.10	1.04	1.10	1.00	1.10	1.00	
Work	1	.07¾	.07¼	.07¾	.07¾	.07¼	.07¾	.07¼	.07¾	.07¼	.06¾	.07¼	.07	3,000

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 185,900 shares.

COLORADO SPRINGS. (*By Telegraph.*)

Name of Company.	Feb. 23.† H.	Feb. 23.† L.	Feb. 24. H.	Feb. 24. L.
Acacia			.10	.09
Alamo			.04¾	.02½
Anaconda			.19	.16
Cripple Creek Con.			.03¼	.05
C. K. & N.				
Doctor Jack Pot			.10¼	.09¾
Elkton, Con.			.38½	.38¼
El Paso			.66	.62
Fanny Rawlings			.05	.04
Gold Dollar Cor			.05¾	.05½

Name of Company.	Feb. 23.† H.	Feb. 23.† L.	Feb. 24. H.	Feb. 24. L.
Golden Cycle				
Golden Fleece			.20	.05
Isabella			.19	.18¾
Jack Pot			.12	.10
Last Dollar			.65	.40
Mollie Gibson			.06¾	.05½
Moon Anchor			.09	.08¾
Pharmacist			.05	.04¾
Portland			1.42	1.39
Work			.07¾	.06¾

† Holiday.

STOCK QUOTATIONS.

MEXICO*. Feb. 13.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200			
Guanajuato.				
Angustias, Pozos	2,400	5.00	80	90
Cinco Senores y An., aviadoras	2,000	15.00	260	265
Cinco Senores y An., aviada	400	10.00	240	250
Providencia, San Juan de la Luz	6,000	2.00	190	200
Queenslard y Australia	300		125	135
Guerrero.				
Garduno y Anexas	7,200		35	60
Hidalgo.				
Amistad y Concordia	9,600	5.30	73½	74
Carmen, aviada	1,100		125	140
Guadalupe Fresnillo mill	1,000		220	300
Guadalupe Fresnillo Mine	1,400		70	80
La Blanca, aviadora	1,538			1,030
La Blanca, aviada	788			780
La Reina y An., aviadora	5,000			22
Maravillas y An., aviador	1,680			170
Maravillas el Lobo	1,000		150	180
Palma y An., aviador	1,800			12
Real del Monte	2,554	10.00	700	800
Santa Ana y An., aviadora	1,800		30	35
Santa Ana y An., aviada	600		25	30
Sta. Gertrudis y An., aviadas	9,000		7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80	80½
Santo Tomas Apostol aviadoras	5,100		5	10
San Felipe de Jesus, aviadora	3,600		36	38
San Felipe de Jesus, aviada	1,200			20
San Rafael y An., Trompillo	1,200	12.00	870	890
San Rafael y An., aviadas	1,200	$4.00	$370	$390
Soledad, aviada	960	5.00	300	320
Sorpresa, aviada	860	5.00	270	275
Mexico.				
Alacran	2,400			40
Buen Despacho	3,000		73	76
Dos Estrellas	3,000	30.00	2,170	2,170
La Esperanza (El Oro)	3,000	10.00	1,200	1,210
La Reformia, aviadores	2,000		60	63
Santa Ana, Esperanza	2,400			96
Michoacan.				
Luz de Borda, aviadora	3,000		50	53
Luz de Borda, aviada	1,000		9	10
San Luis Potosi.				
Concepcion y An	3,000		60	70
El Barreno, aviadora	2,000	2.00	58	64
Sta. Maria de la Paz	2,400	10.00	765	780
San Diego y Annexas	2,400	4.00	40	45
Zacatecas.				
Asturiana y An	2,500		45	
Candelaria y Pinos	2,500	10.00	340	350
Esperanza y An	2,400		50	60
Lourdes	2,500			
Luz de Minillas, pagadoras	2,000		20	30
San Carlos y Annexas	2,500	20.00		190
Sta. Maria de Gaud	2,500	10.00	135	145
Miscellaneous.				
Bartolome de Medina	2,000	1.50	73	75
Guadalupe Hacienda	10,000	3.00	255	265
La Luz Hac. (Pachuca)	3,750			280
La Reina (Chihuahua)	192			
Naica (Chihuahua)	100		6,000	
Natividad (Oaxaca) aviadora	1,800	6.00	550	650
Natividad (Oaxaca) aviadas	600	4.00	500	550
San Francisco Hac	6,000	1.00	42	45
Santa Ana Huantla Morelos	4,000			
Union Hacienda	3,000	5.00	280	285

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	February. 23.*	February. 24.	Name of Company.	February. 23.†	February. 24.
Belcher	....	.48	Justice	....	.09
Best & Belcher	....	2.00	Mexican	....	1.40
Caledonia	....	2.20	Occidental Con	....	.40
Challenge Con	....	.58	Ophir	....	2.10
Chollar	....	.39	Overman	....	.60
Confidence	....	1.75	Potosi	....	.50
Con. Cal. & Va	....	2.10	Savage	....	.31
Con. Imperial	....	.03	Sierra Nevada	....	1.05
Crown Point	....	.42	Union Con	....	1.15
Gould & Curry	....	.58	Utah Con	....	.38
Hale & Norcross	....	1.05	Yellow Jacket	....	.56

*Holiday.

SALT LAKE CITY.* Feb. 20.

Name of Company	Shares.	Par Val	High	Low	Sales.	Name of Company.	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.31½	.29	3,200	M. Washington			.07¾	.05½	64,000
Ben Butler	500,000	1				Mammoth	400,000	25			
Bullion-Beck	100,000	10				May Day	400,000	.25	.16	.15¾	6,500
California	300,000	1	26	22	13,800	N. Y. Bonanza			.26½	.22	19,700
Carisa	500,000	1	.20½	.18¾	14,200	Ontario	150,000	100	6.40	6.25	135
Century	150,000	1	.80	.72½	1,100	Sacramento	1,000,000	5	.27¼	.26⅞	9,100
Con. Mercur	1,000,000	5	1.73	1.70	4,100	Star Con	500,000	1			
Daly			5.50	4.50	3,925	Swansea	300,000	1			
Daly-Judge	300,000	1	10 15	9.87½	3,290	Sunshine	250,000	10			
Daly-West	180,000	20	39.85	38 92½	435	Uncle Sam, Con	500,000	1	.26½	.22	14,190
Grand Central	250,000	1	5.90	5 22½	2,800	Victor	500,000	1	.23	.23	1,000
L. Mammoth	150,000	1	.74½	.69¼	2,700	Wabash			.43	.34½	33,200
La Reine			.04¾	.04¾	7,000	Yankee Con	500,000	1	.49	.43¾	1,900

All mines are in Utah. *By our Special Correspondent. Total sales, 205,975 shares.

ST. LOUIS, MO.* Feb. 21.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.00	$0.70	Columbia Lead, Mo.	$500,000	10	11.00	12.50
Catherine Lead, Mo.	500,000	10	1.50	3.00	Con. Coal, Ill	500,000	100	21.00	25.00
Central Coal & C	1,875,000	100	66.75	68.00	Doe Run Lead Co.	1,500,000	100	100.00	103.00
Central C. & C., pf.	1,875,000	100	.70	.72	Granite Bimet., Mt.	1,000,000	10	1.00	1.10
Central Lead, Mo	1,000,000	10	130.00	135.00	St. Joe Lead, Mo	6,000,000	10	16 50	17.50

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Feb. 18. H.	Feb. 18. L.	Feb. 19. H.	Feb. 19. L.	Feb. 20. H.	Feb. 20. L.	Feb. 21. H.	Feb. 21. L.	Feb. 23.† H.	Feb. 23.† L.	Feb. 24. H.	Feb. 24. L.	Sales
Am. Alkali, Mich	$50													
Am. Cement	10	8		8⅛	8							8⅛		200
Cambria Iron, Pa	50	49		48⅞								48⅞		40
Cambria Steel, Pa	50	25¼	25	25	24⅞	25						25	24⅝	2,349
Penn. Steel, pfd	100	92¼		92⅝	92	92								156
Susq. I. & S., Pa	5			2⅜		2⅜						2⅜		625
United Gas I., Pa	50	113	112	112¾	112½	112½	112¼					112		2,315
Warwick I. & Steel	10	5¼												300

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 5,985 shares.
† Holiday.

LONDON. Feb. 13.

Name and Country of Company	Authorized Capital.	Par value.	Latest dividend. Amt.	Latest dividend. Date	Quotations. Buyers.	Quotations. Sellers.
	£	£. s. d.	s. d.		£. s. d.	£. s. d.
Alaska-Treadwell, g., Alaska	1,000,000	5 0 0	1 6	Jan., 1903	4 12 6	4 15 0
Anaconda, c. s., Montana	6,000,000	5 0 6	2 0	Nov., 1902	5 12 6	5 15 0
Arizona, c., Def., ord	63,444	1 0 0	5 6	Feb., 1903	7 0 0	7 10 0
Arizona, pref., ord	316,530	1 0 0	5 6	Feb., 1903	7 7 6	7 12 6
Camp Bird, g., Colo	1,000,000	1 0 0	0 7½	Mar., 1903	1 8 0	1 9 0
Copiapo, c., Chile	225,000	2 0 0	2 6	Dec., 1901	1 17 6	2 2 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	13 9	16 3
Enterprise, g., British Col	200,000	1 0 0			2 6	7 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 10 0	1 12 6
Frontino & Bolivia, g., Colombia	140,000	1 0 0	3 0	July, 1901	18 9	1 1 3
Le Roi, g., British Col	1,000,000	5 0 0	5 0	Nov., 1899	1 7 3	1 10 0
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	1 17 6	1 0 0
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	4 6	5 0
Montana, g. s., Montana	660,000	1 0 0	6	April, 1899	2 0	3 0
Mountain, c., Cal	1,250,000	5 0 0	4 0	Nov., 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,100,000	1 0 0	6	April, 1902	8 6	9 6
St. John del Rey., g., Brazil	600,000	1 0 0	6	Dec , 1902	14 6	15 6
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 6	Jan., 1903	6 5 0	6 15 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	11 3	13 9
European:						
Linares, l., Spain	45,000	3 0 0	9	Oct., 1902	2 15 0	3 5 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	13 0	May, 1902	3 10 0	4 0 0
Rio Tinto, c., Spain	1,625,000	5 0 0	22 6	Nov., 1902	45 12 6	45 17 6
Rio Tinto, pref., Spain	1,625,000	5 0 0	2 6	Nov., 1902	6 0 0	6 5 0
Tharsis, c., Spain	1,250,000	2 0 0	8 0	May, 1902	4 15 0	5 0 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	500,000	1 0 0	1 6	Jan., 1900	2 0 0	2 2 6
Briseis, Tin, Tasmania	600,000	1 0 0			10 0 0	11 0
Broken Hill Pr'p., s., N. S. Wales	384,000	8 0	1 0	Aug., 1902	1 11 3	1 12 6
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	16 0	17 0
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Nov., 1902	10 0 0	10 2 6
Great Fingall Con., W. Australia	124,061	1 0 0	5 0	Sept., 1902	7 11 3	7 13 9
Great Bo'd'r Pr'p., W. Australia	175,000	2 0	6	Oct., 1902	1 1 6	1 2 0
Ivanhoe Gold Corp. W. Australia	1,000,000	5 0 0	4 0	Jan., 1903	8 10 0	8 12 6
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Oct., 1902	4 8 9	4 11 3
Lake View Cons., g., W. Australia	250,000	1 0 0	5 0	Nov., 1901	3 0 0	3 2 6
Mt. Lyell M. & R. L., c., Tasmania	325,000	3 0 0	1 0	Dec., 1902	2 12 6	2 15 0
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Jan., 1902	4 2 6	4 7 6
Waihi, g., New Zealand	497,412	1 0 0	2 6	Mar., 1903	5 7 6	5 10 0
Indian:						
Champion Reef, g., Colar Fields	236,500	10 0	2 0	Sept., 1902	6 18 9	7 1 3
Mysore Gold, Colar Fields	265,000	10 0	4 0	Nov., 1902	7 0 0	7 2 6
Nundydroog, g., Colar Fields	242,000	10 0	1 3	Nov., 1902	2 2 6	2 5 0
Ooregum, g., Colar Fields	171,500	10 0	1 3	Dec., 1902	1 13 9	1 16 3
Ooregum, pref., g., Colar Fields	120,000	10 0	1 3	Dec., 1902	2 2 6	2 5 0
African:						
Angelo, g. Transvaal	275,000	1 0 0	6 0	Feb., 1903	7 12 6	7 17 6
Bonanza, Transvaal	200,000	1 0 0	11 0	Aug., 1902	5 13 9	5 16 3
British South Africa	5,000,000	1 0 0	rts.	May, 1899	3 7 6	3 10 0
Cape Copper, S. Africa	600,000	2 0 0	2 3	Dec., 1902	3 0 0	3 5 0
Cape Copper, pref., S. Africa	150,000	2 0 0	2 3	Dec., 1902	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	1,360,000	4 0 0	3 0	Aug., 1899	6 12 6	6 17 6
Crown Reef, g., Transvaal	120,000	1 0 0	10 0	Oct., 1902	17 5 0	17 15 0
De Beers Con., d., pref., Cape Colony	2,000,000	2 10 0	10 0	Jan., 1903	19 13 9	19 16 3
De Beers Con., def	2,100,000	2 10 0	12 6	Jan., 1903	21 10 0	21 12 6
East Rand Estates, Transvaal	400,000	1 0 0			6 18 9	7 1 3
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May, 1902	8 8 9	8 10 0
Ferreira g., Transvaal	90,000	1 0 0	20 0	Jan., 1903	23 10 0	24 0 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	7 0 0	7 2 6
Geduld, g., Transvaal	400,000	1 0 0	rts.	May, 1902	8 7 6	8 8 9
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 2 6	9 7 6
Jagersfontein, d., Orange F. S.	1,000,000	5 0 0	6 0	Nov., 1899	26 2 6	26 7 6
Jubilee, g., Transvaal	50,000	1 0 0	5 0	July, 1899	5 15 0	6 5 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	4 2 6	4 7 6
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 7 6	4 8 9
May Con., g., Transvaal	200,000	1 0 0	3 0	Feb., 1903	4 11 3	4 13 9
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 15 0	6 0 0
Namaqua, c., Cape Colony	200,000	2 0 0	2 0	June, 1902	3 5 0	3 10 0
Primrose (New), g., Transvaal	300,000	1 0 0	3 0	Feb., 1903	4 0 0	4 2 6
Rand Mines, g., S. Africa	448,989	5 0	4 0	Aug., 1902	11 5 0	11 6 3
Robinson, g., Transvaal	2,750,000	5 0 0	6 0	Feb., 1903	10 15 0	11 0 0
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	5 6 3	5 8 9
Rose Deep, Transvaal	425,000	1 0 0	1 11	Feb. 4, 1903	9 0 0	9 5 0
Salisbury, g., Transvaal	93,000	1 0 0	2 0	Mar., 1899	2 17 6	3 0 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 6 3	1 7 6
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 17 6	9 2 6
Wemmer, Transvaal	80,000	1 0 0	15	July, 1902	13 0 0	13 10 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Feb. 17. £.	s.	d.	Feb. 24 £.	s.	d.	Name of Company	Feb. 17. £	s.	d.	Feb. 24. £.	s.	d.
Anaconda	6	5	0	6	2	6	Johannesburg Invest	3	8	9	3	6	3
British South Africa	3	7	6	3	5	0	Modderfontein	11	0	0	10	17	6
Camp Bird	1	9	3	1	9	3	Rand Mines	11	1	3	10	16	3
Con. Gold-Fields	7	18	9	7	15	0	Rio Tinto com	47	7	6	48	7	6
De Beers Con. def	21	8	9	21	7	6	Simmer & Jack	1	15	7½	1	15	0
East Rand	8	5	7½	8	2	6	Tomboy	2	1	3	1	18	9
Jagersfontein	25	17	6	26	5	0							

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Feb. 4

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing Fr.
Boleo	Lower Cal	Copper		500	176.00	1,311.00	1,350.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	23.00	23.00
Fraser River	Brit. Col'mb.	Gold	250,000	25		6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	86.25	91.50
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	465.00	477.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	459.00	450.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25		1.00	1.00
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	618.00	632.50

TORONTO, ONT.* Feb. 23.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.07	.04½		Granby Smelter	$10	525	450	
Cariboo (Mc. K.)	1	.18	.14		Mountain Lion	1	.17	.10	
Cariboo (Hyd.)	1	.75			North Star	1	.14	.10	1,000
Center Star	1	.35	.32	1,500	Nova Scotia Steel, com	100	113	112	
Crows Nest, C	100	400	300		Payne	1	.21	.18½	1,000
Dominion Coal, com	100	129½	128		Rambler Cariboo	1	.35	.28	
Dominion S. & I	100	54	52	20	Republic	1	.07½	.05	
Dominion S. & I., pref	100				St. Eugene	1	.35	.25	
Fairview	1	.06½	.04½		Virtue	1	.09	.05	
Giant	1	.03½	.02		War Eagle Con	1	.19½	.17½	1,500

*Standard Stock and Mining Exchange. Total sales 5,020 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust.Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont., car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	28.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01¾@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg.	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06
ALCOHOL—Grain	gal.	2.43@2.45
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.75
Ground	"	1.80
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07¼
Powdered	"	.08fn
Muriate	"	.05¾
Lump	"	.08¼
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.02¾@.03½
Red	"	.06¾@.07
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh.ton	35.00
San Valentino (Italian)	lg.ton	16.00
Seyssel (French), mastic	sh.ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05½

BARIUM	Cust.Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
German, gray	"	14.50
Snow white	"	17.00
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	1.40
Subcarbonate	"	1.65
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE	"	.35
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.30
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.70@1.90
Foreign	"	1.65@2.25
"Rosendale," 300 lbs	"	.75
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.12½
White	"	.13½
CHALK—Lump, bulk	sh.ton	2.50
Ppt. per quality	lb.	.03¾@.06
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.00
Am. best, ex-dock, N. Y.	"	9.00
English, common	"	12.00
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—in bulk	100 lbs.	.42½
In bbls	"	.47½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A.	25 lb. keg	.65
Blasting powder, B.	"	1.40
"Rackarock," A.	lb.	.25
"Rackarock" B.	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13¾@.13¾
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump. 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH—Lump .100 lbs.		.75
Powdered	"	.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	Cust.Meas. sh.ton	Price. $8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv.	"	.01fn
GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.08@.08¼
Brown	"	.06@.06¼
Nitrate, com'l	"	.06½
" gran.	"	.08¼
LIME—Com., abt. 250 lbs.	bbl.	.80
Finishing	"	.90
MAGNESITE—Greece.		
Crude (95%)	lg.ton	6.00@6.50
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.09
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.30
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse.	sh.ton	33.00@38.00
Fine	lb.	.00⅝@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1.	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.:		
25@30, cold test	gal.	.11½@.12½
15, cold test	"	.12½@.12¾
Zero	"	.13½@.13¾
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.10¼@.11¾
Dark, filtered	"	.15½@.17½
Light, filtered	"	.16½@.19
Extra cold test	"	.27½@.31½
Gasoline, 86°@90°	"	.15@.20
Naphtha, crude, 68°@72°	bbl.	9.05
"Stove"	gal.	.12½
Linseed, domestic raw	"	.44@.46
Boiled	"	.48
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.05
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.25
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.04¾@.05¼
English flake	"	.08¼@.08½
Glassmakers'	"	.07¼@.08

PAINTS AND COLORS—	Cust.Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01¾
Orange mineral, Am.	"	.07¾@.08
Foreign, as to make	"	.08¼@.11¼
Paris green, pure, bulk	"	.10¾@.11
Red lead, American	"	.05¾@.06
Foreign	"	.06¾@.08
Turpentine, spirits	gal.	.66@.66½
White lead, Am., dry	lb.	.04½@.04¾
American, in oil	"	.05½@.05¾
Foreign, in oil	"	.06¾@.09¼
Zinc, white, Am., ex dry.	"	.04¾@.04¾
American, red seal	"	.06¼
Green seal	"	.07
Foreign, red seal, dry	"	.05¾@.08¼
Green seal, dry	"	.06½@.09½
POTASH		
Caustic, ordinary	"	.04½@.04¾
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08¼@.08¾
Scotch	"	.08½@.09
Bromide, bulk	"	.22
Carbonate (80@85%)	"	.02¾@.03
Chromate	"	.35
Cyanide (98@99%)	"	.20@.21¼
Kainit	lg.ton	9.05
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13@.13¼
Red	"	.33
Sulphate, 90%	100lbs.	2.11
96%	"	2.14
Sylvanit	unit	.39½
QUARTZ—(See Silica).		
SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100lbs.	3.37½@3.40
Refined	"	4.25@4.62½
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate	"	.39½
Oxide	"	.85@1.10
SODIUM—		
Bichromate	lb.	.06¼
Chlorate, com'l	"	.07¼@.07¾
Hyposulphite, Am.	100 lbs.	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.00
Shipments	"	1.85@1.97½
Peroxide	lb.	.45
Phosphate	"	.02¼@.02¼
Prussiate	"	.09¾
Silicate, conc.	"	.06
Com'l	"	.01
Sulphate, com'l	100 lb.	.75@82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	13.75
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	1.25
Italian, best	"	1.62½
TAR—Regular	bbl.	2.30
Oil barrels	"	4.30
TIN—Crystals	lb.	.22
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09¾
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04¾
Dust	"	.04¾@.04½
Sulphate	"	.02½@.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.50
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Nitrate	oz.	.50
STRONTIUM—Nitrate	lb.	.07@.07¾
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.